American Machinist

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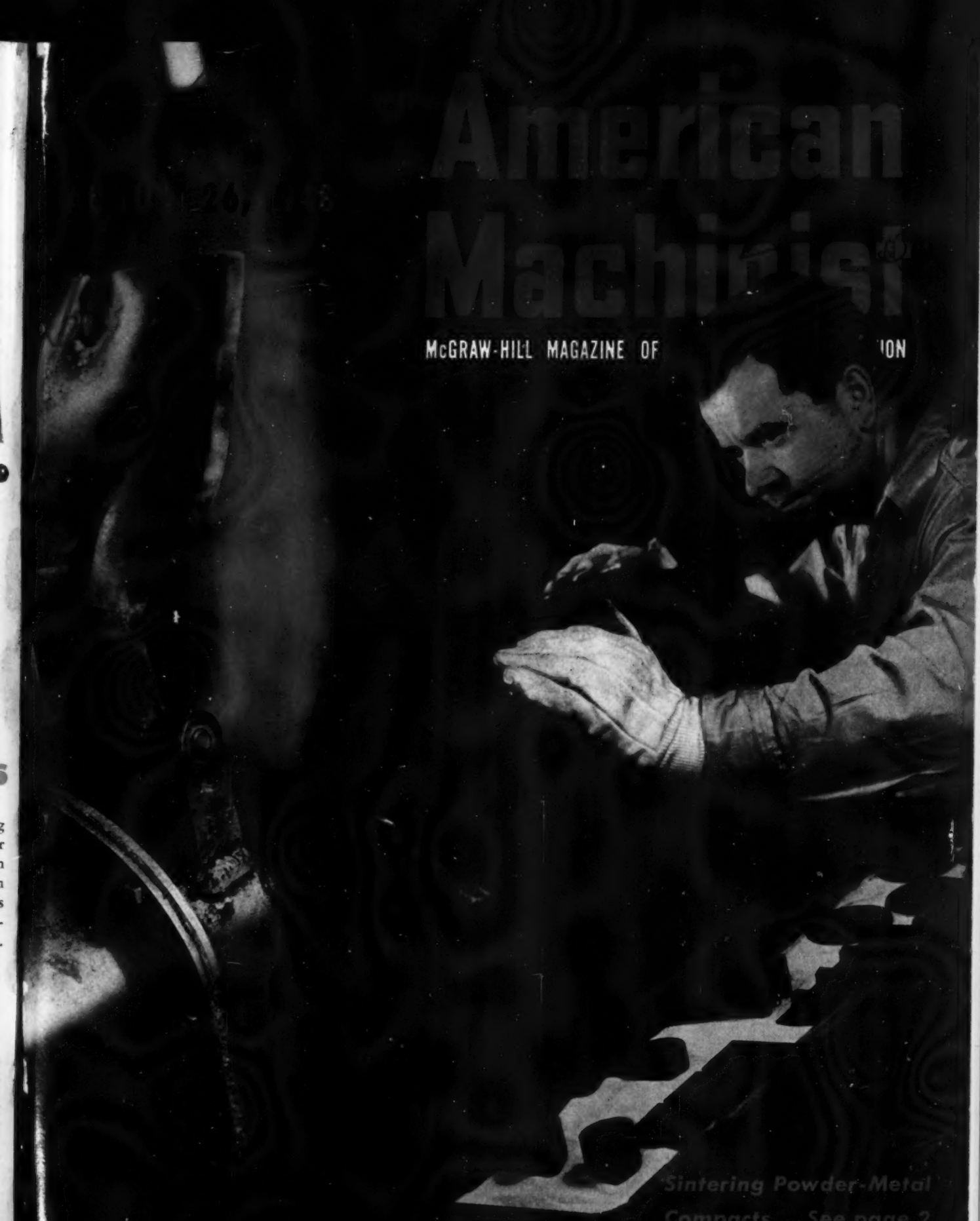

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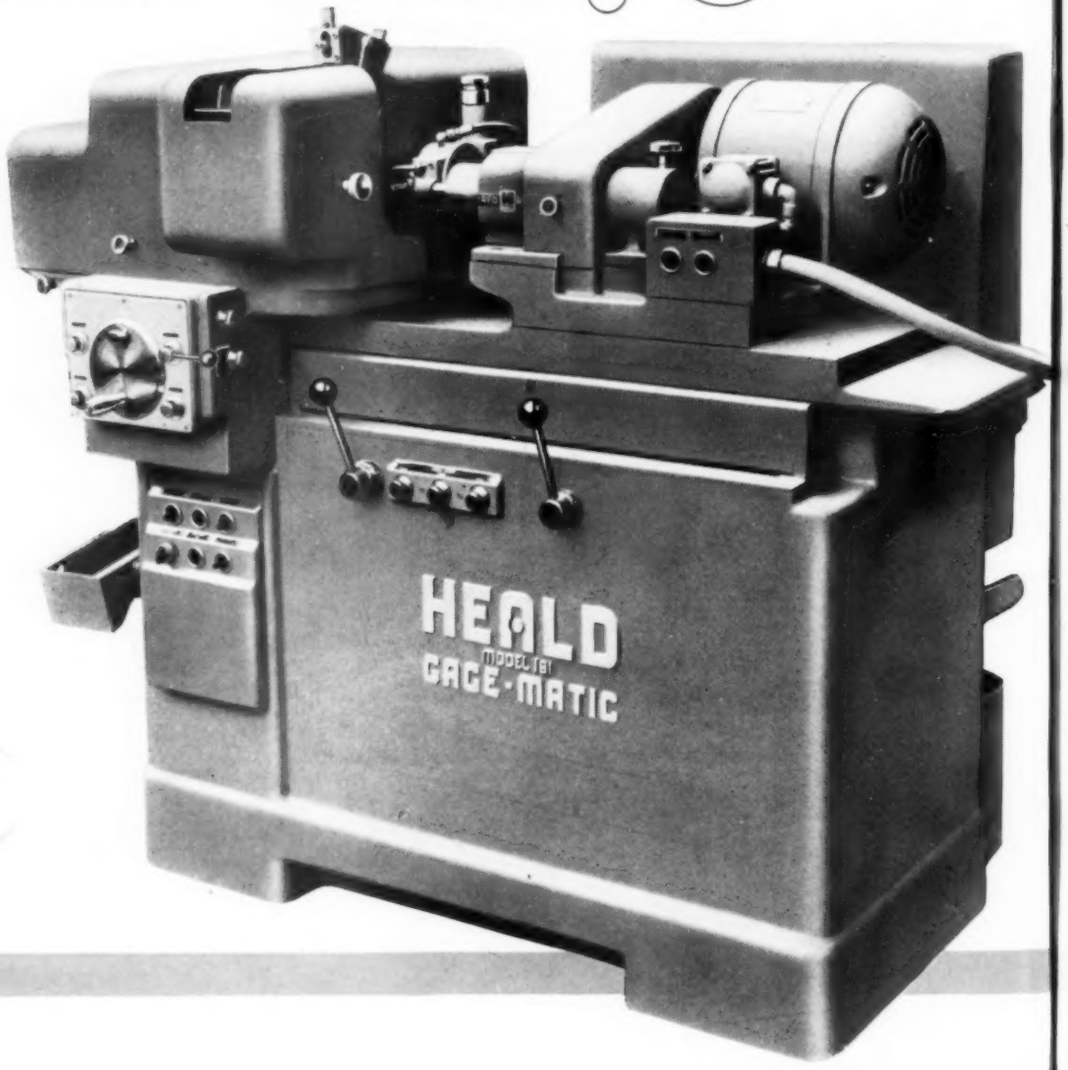
- HOW TO REPAIR CRACKED PRESSES
- EVALUATING SUPERVISORY JOBS

Completely New Completely Automatic

MODEL 181 HEALD CENTERLESS

Designed for high-speed precision finishing of small parts



IT'S THE 25TH NEW HEALD MACHINE

From base to bridge, this Heald Model 181 Internal Centerless is *entirely new*. It offers many advanced features that mean long-range economy in the internal grinding of small to medium size work that can be rotated on its outside diameter.

The machining cycle is completely automatic from the time the work rolls from the loading chute until it drops out as a finished part. One operator can easily handle several machines. Like the other new Heald models, it also incorporates such outstanding features as: *New Feed Mechanism—Uniform Speeds and Feeds—Sealed Hydraulic System—Centralized Controls—Anti-friction Cross-Slide—Rapid Machine Cycles—Automatic Lubrication—Isolated Power Unit.*

The Heald principle of centerless internal grinding represents years of background and skill in producing machines that continually set the pace for high-speed precision finishing.

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THE HEALD MACHINE COMPANY, Worcester 6, Mass.

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TECHNOLOGY DEPARTMENT

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Chips and Quips

Our Cover . . . Powder-metal compacts are pre-formed, then sintered in a furnace to set and fuse them. Our cover Kodachrome shows Charles Krause at Carboloy about to insert a case of compacts into the furnace. In the case beside the furnace, the pointed objects in front are various sizes of solid Carboloy lathe centers. The next two round pieces are carbide mandrels, the three large flat pieces special-form wear-resistant tips. The tall cylindrical parts are plug bushings; the special shapes at their right are wear-resistant inserts. Flat disks behind them are for solid carbide saws and those in the extreme right-hand corner are drill-jig bushings.

Tooling . . . As usual, we've hunted out an interesting and varied group of new tooling methods. First there's G. H. Cottrell, Richmond Works Manager for International Harvester, describing his high-production setup for spinning stainless-steel skimmer disks for cream separators . . . Then K. R. McKay, general supt. of the same plant, describes some special lathes that handle taper cutting on valve parts for the separator . . . There's a story on air motors to operate scroll chucks on a milling fixture, from Leonard Heinlein, asst. supt. of the Dodge plant of Link-Belt. . . . And a group of Shop Shots from Kalamazoo Stove . . . Then we've a new feature—a spread of pictures of some unusual tooling jobs. We'll appreciate your opinion of the latter, in particular.

Metalock . . . Some months ago, as we went through the plant of Worcester Pressed Steel Co., Worcester, Mass., we noticed a number of presses being repaired. Our guide, J. W. Hillhouse, equipment engineer, explained that some 20 presses had been repaired in the preceding six months, at outstanding savings, by a new process that did not take them out of production. We asked for details—and got them for our lead article. Mr. Hillhouse, an accomplished sketcher, even provided step-by-step sketches.

Checking Supervisors . . . Many men talk of the virtues of job evaluation applied to supervisory personnel, but rarely can a company be found with a good working system—good enough, at least, to talk about. We found one, however, at Lockheed Aircraft, and in this issue Orel R. Winjum, wage and salary specialist, tells you how and why it works. It makes an unusual special report which will fit jobs at salaries up to $15,000 a year.

Research . . . We feel that all production men should have some knowledge of sales methods, so occasionally provide a pertinent article on the subject. In this issue, Murray Jenkins tells how market research can help small companies and aid in long-range production planning.

Coming . . . Sept. 9 *A.M.* will carry the first half of a really intensive study of surface quality. Ben Brosheer, out in Chicago, has been collecting data and contacting experts for two years or more. When he put all his data together, he had better than 56 magazine pages. Now, some weeks and much midnight oil later, we've whittled that to 32 fact-crammed pages. We believe this is the most up-to-date and complete job that has been done on a subject of fast-growing importance.

Other articles include one on selective shot blasting, one on maintenance oils for machine tools, another on gear grinding, one on machining copper, jigs for a trolley coach, thread rolling, and several others.

OREL R. WINJUM

EVALUATOR . . . Orel R. Winjum, author of the special report on supervisory job evaluation in this issue, majored in Political Science (Public Administration) at the University of California at Los Angeles and in 1938 obtained his Master's degree at the same University.

After service with Los Angeles County as a classification technician, he joined Lockheed Aircraft Corporation in June, 1941 as Job Analyst and moved up steadily to his present position as Wage and Salary Specialist. Winjum has served as chairman of several company committees on job evaluation and wage administration, and during the war represented the Southern California Aircraft Industry on a joint Industry-Labor Panel of the Tenth Regional War Labor Board.

CARBIDE CONTROLLER . . . Hans Branders was graduated from The University of Technology in Helsingfors, Finland, in 1924 with the degree of Mechanical Engineer. At present he is chief engineer in charge of production at the Karhula Works of A. Ahlstrom OY, with whom he has been associated since 1930. This company produces paper, pulp, plywood, and various kinds of machinery, and its machine shops produce machinery for paper, pulp, plywood, cardboard, wallboard and steel mills. They are also manufacturing centrifugal pumps, rear axles for a Finnish motor truck, and equipment for the mining industry.

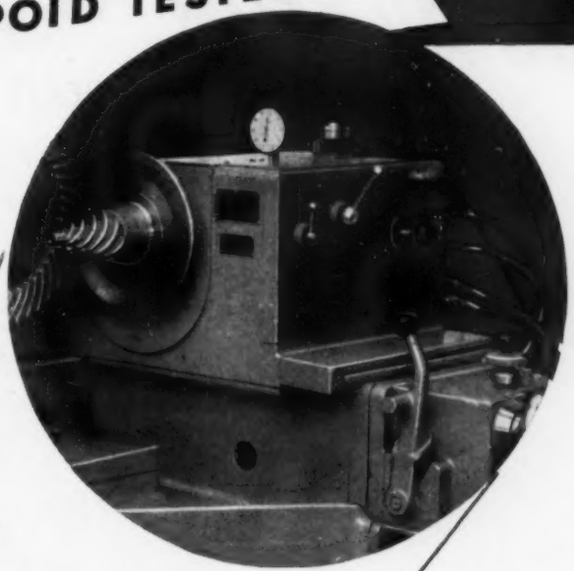
Mr. Branders has been a member of the SAE since 1926. He authored the Aug. 12 article on carbides in his country.

HANS BRANDERS

SIMPLIFIED TESTING

WITH THE NEW GLEASON NO. 17A HYPOID TESTER

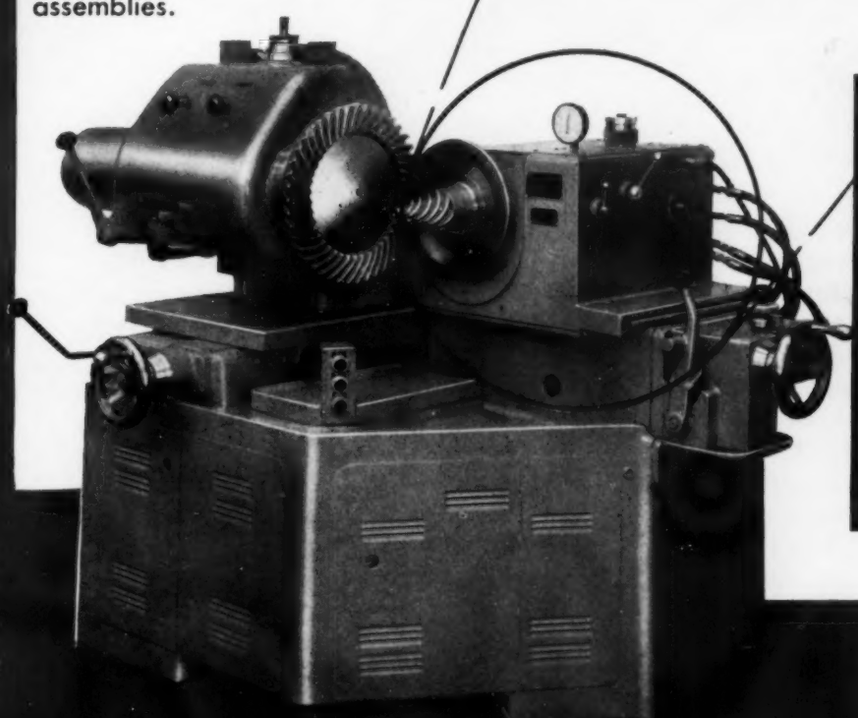
A running test, simulating actual operation of gears in final assembly, is the only positive method of determining how gears will operate in their final mountings.



BEFORE PRODUCTION—to establish the correct setup for the gear cutting machine.

DURING PRODUCTION—to maintain uniform quality of the cut gears.

FINAL TEST—to find the best running quality of the gears for assembly . . . eliminating costly fitting or tearing down and rebuilding of assemblies.



Correct mounting may now be read simply and easily from an indicator with the New Gleason No. 17A Tester. Designed with a dial adjustment which once set up, automatically duplicates backlash on each pair of gears, this machine simplifies obtaining the best running position of gears in final assembly.

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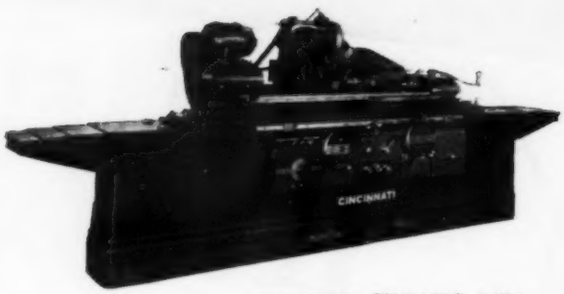
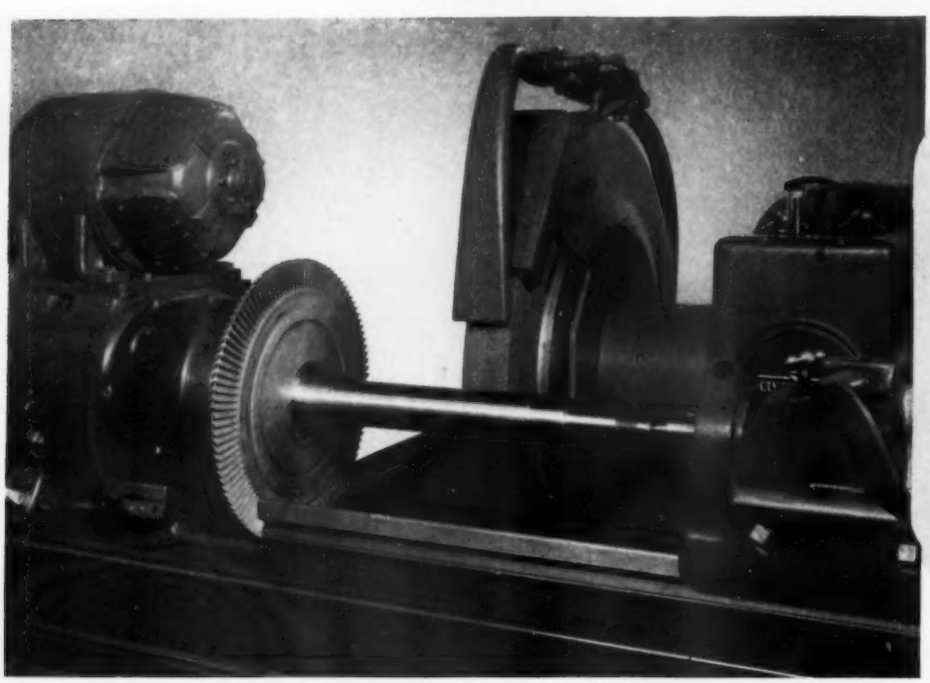
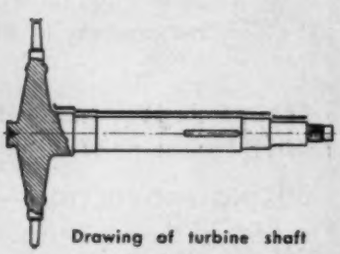


CINCINNATI FILMATIC 14"-L Plain Hydraulic Grinding Machine. Catalog G-572 contains complete specifications.

has an extra long reach

TO GRIND BUCKET DIAMETER AND SHAFT DIAMETER





Drawing of turbine shaft and bucket assembly, ground to accurate limits on CINCINNATI FILMATIC 14"-L Plain Hydraulic Grinder. Heavy lines indicate ground diameters.

A manufacturer of electric motors wanted to grind turbine shaft and bucket assemblies on the same machine ordinarily employed to grind conventional motor shafts. Standard machines of suitable capacity for the bucket diameters would be uneconomical for the comparatively small shaft diameters. With an eye to low capital expenditure, Cincinnati Application Engineers recommended a CINCINNATI FILMATIC 14"-L Plain Hydraulic Grinder with a gap table, extra cross range, and electronic headstock drive. It efficiently grinds 18" diameters with a new 30" wheel, down to 0" diameter with a worn 22" wheel. ¶Manufacturers throughout the world have profited through Cincinnati Engineering Service. It will pay you, too, to bring your grinding problems to our Application Engineers. They have a wide range of machines, both centerless and center-type, on which to base their recommendations. May we hear from you?

CINCINNATI

CINCINNATI GRINDERS INCORPORATED

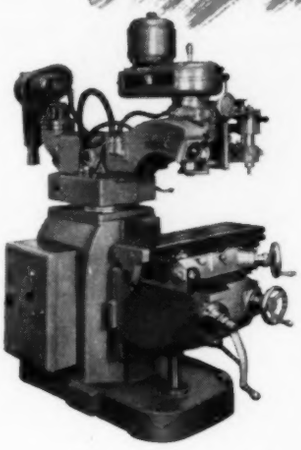
CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES

accurately and quickly copy anything put under the tracing finger. Look at the example shown here. Except for tone, master and copy look exactly alike. Just think what this means in reducing the cost of hand tooling. We can show you many comparable examples of work.

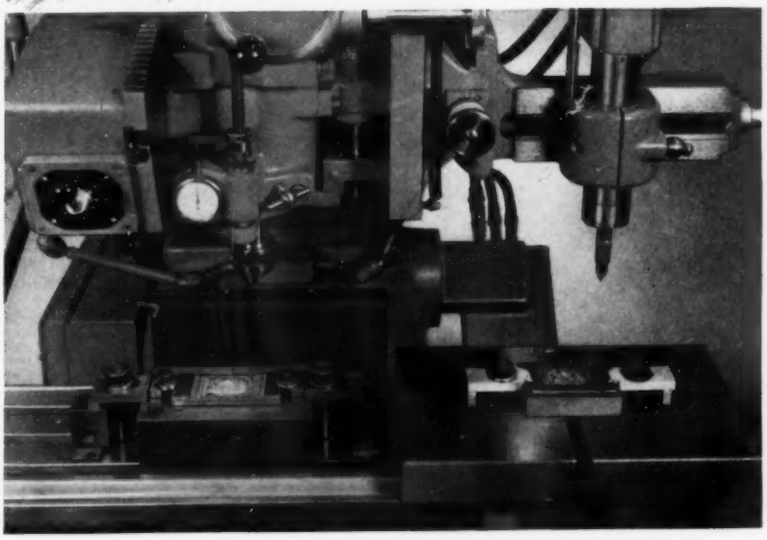
Yours faithfully

CINCINNATI 8" x 18"
TOOL AND DIE MILLER



CINCINNATI 8" x 18" Tool and Die Miller offers other advantages: The spindle head swivels in two planes for universal milling; turret construction permits quick setup of slotting head. Write for catalog M-1620.

CINCINNATI



Above: Setup on CINCINNATI 8" x 18" Tool and Die Miller for copy milling the die shown below.

Right: Master

Left: Die, copy milled on CINCINNATI 8" x 18" Tool and Die Miller. *The die has not been hand tooled nor the photograph retouched.* Time, 7 hours.

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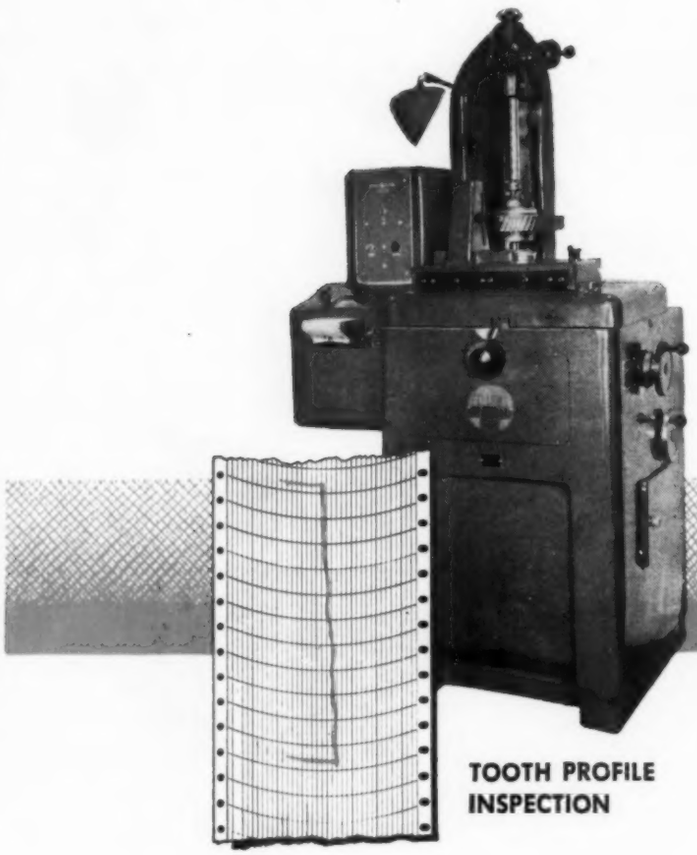
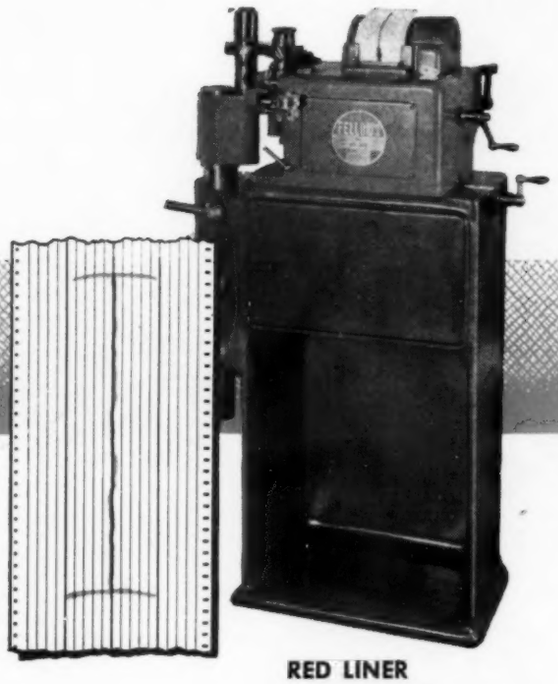


TOOTH PROFILE INSPECTION



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ERRORS IN COMBINATION Eccentricity, variations in circular pitch and pressure angle, fillet interference, lack of continuous action	Red Liner	8M 20M	8 inches 18 inches
INDIVIDUAL TOOTH ELEMENTS Spacing, concentricity and taper	Cone Spacing Inspection Instrument Cone Spacing and Taper Inspection Instrument	12C 12CT	12 inches 12 inches
LEAD, CROWN AND TAPER	Lead Measuring Instrument	12H	12 inches

*Available with or without automatic electronic recording device.

. . . a "Will-o-the-Wisp"

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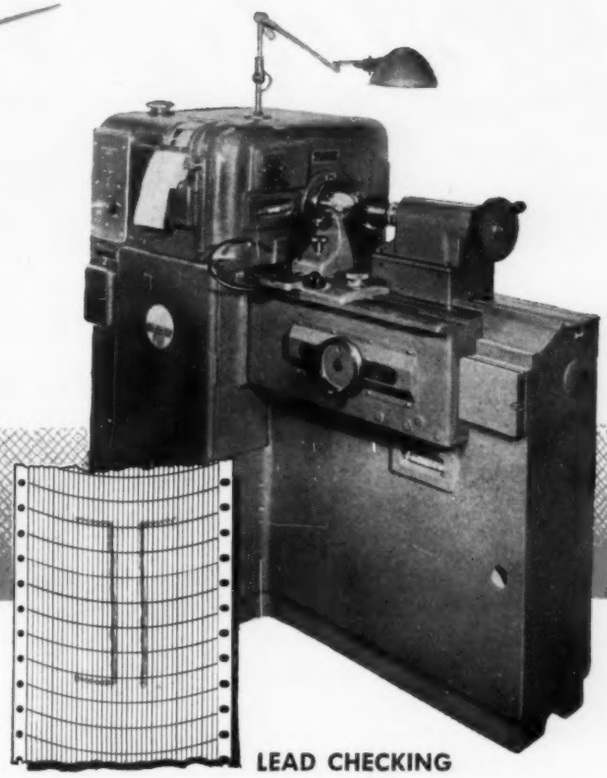

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THE FELLOWS METHOD . . . MACHINES AND TOOLS FOR ALL OPERATIONS FROM BLANK TO FINISHED GEAR

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Packed with tips for product designers, resistance welder operators, and production men

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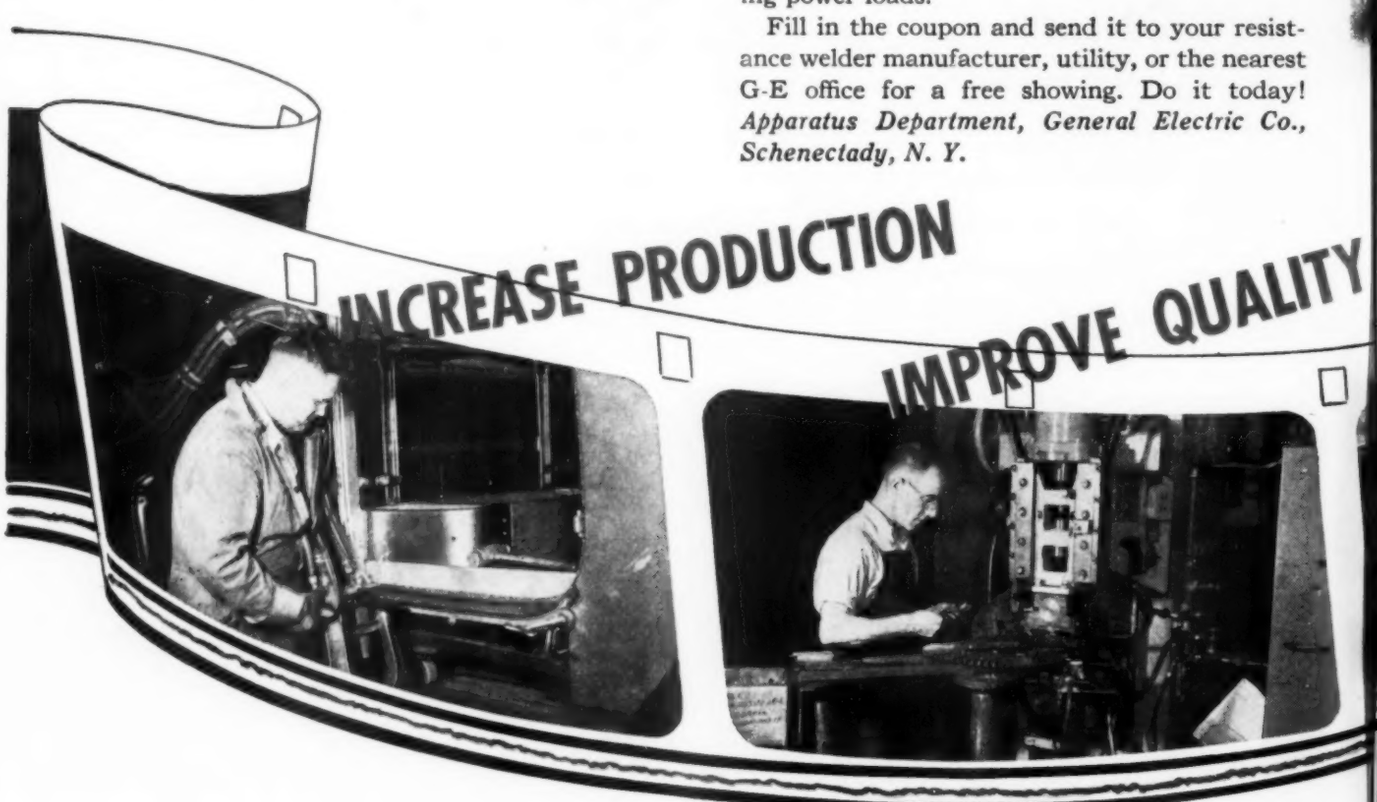
Operators will better understand electronic control through the animated cartoons and simplified explanation of the factors (such as the type of material to be welded, its thickness, and electrical resistance) determining the magnitude and timing of current.

At the showing of the film you will also receive a review manual that describes all phases of resistance welding and contains a section of interest to engineers who are faced with increasing power loads.

Fill in the coupon and send it to your resistance welder manufacturer, utility, or the nearest G-E office for a free showing. Do it today! *Apparatus Department, General Electric Co., Schenectady, N. Y.*



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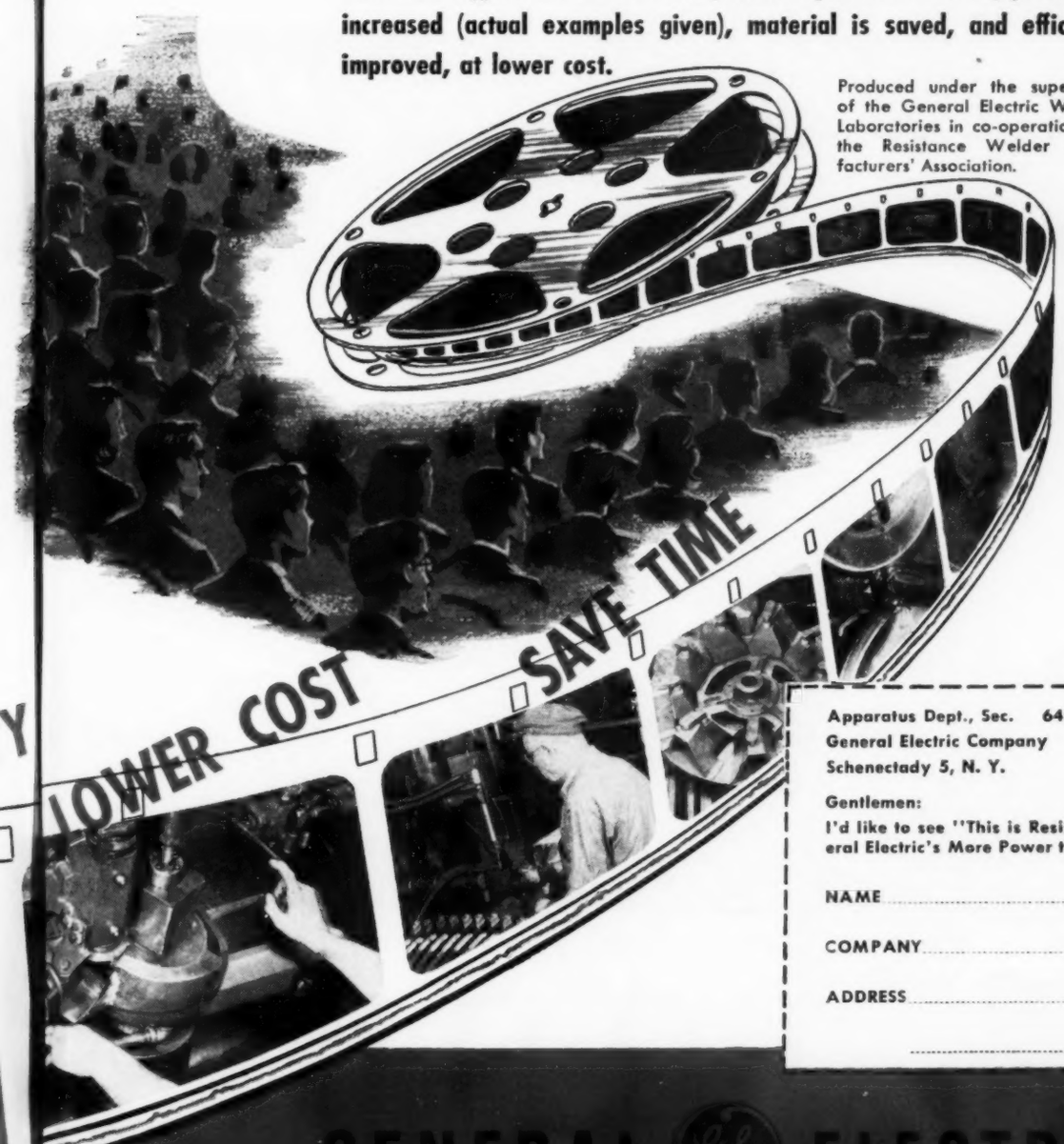

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General Electric Company
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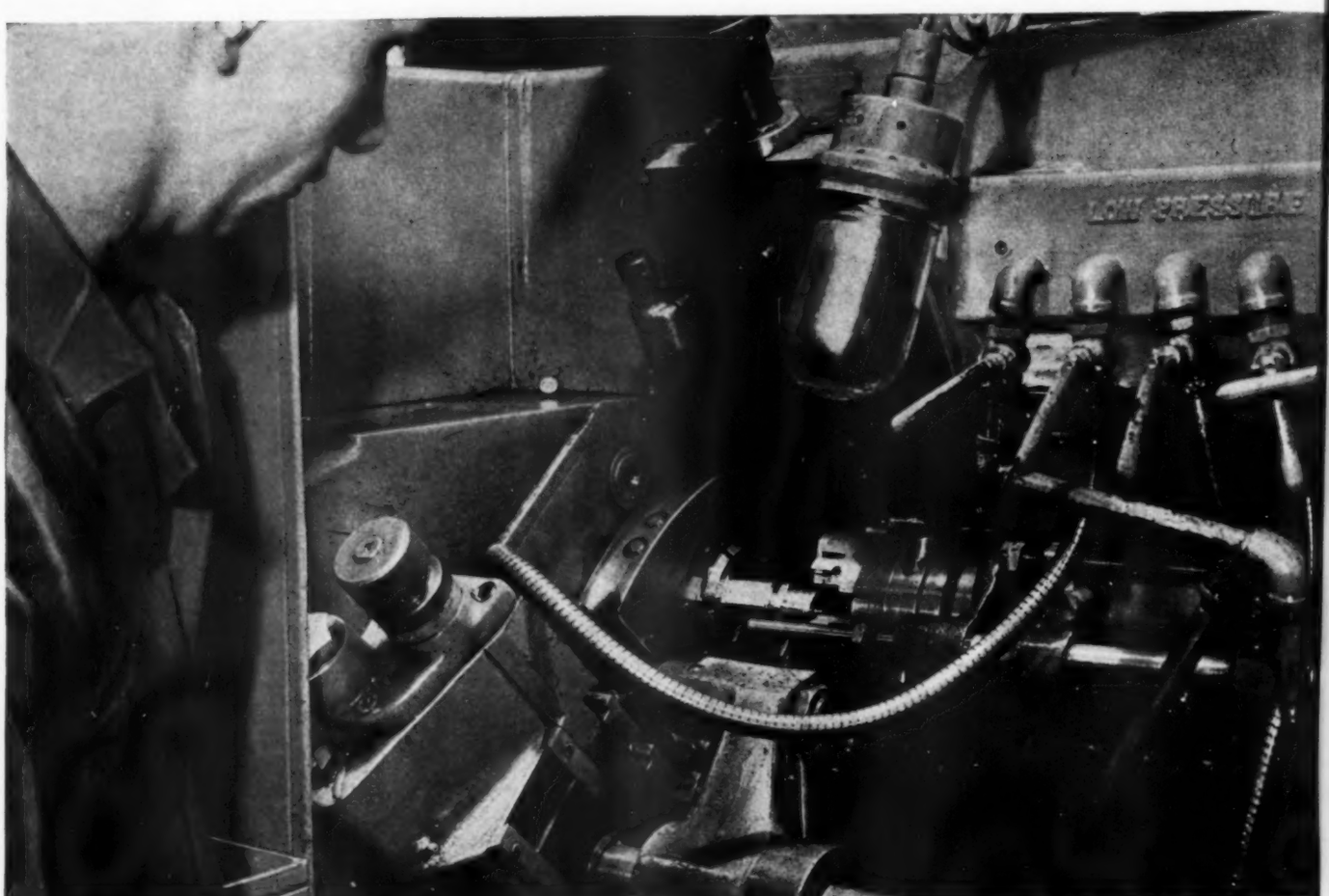
GENERAL ELECTRIC

Designed for PRODUCTION,

LANDEX HEADS.....FOR AUTOMATIC

LANDIS
REG U.S. TRADE-MARK PAT. OFF.

• In the illustration, the Type J LANDEX Heat Treated Head is being used on an automatic screw machine to produce 15/16″ diameter 16 pitch threads on stainless steel hex head bushings.



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PRECISION, & ECONOMY

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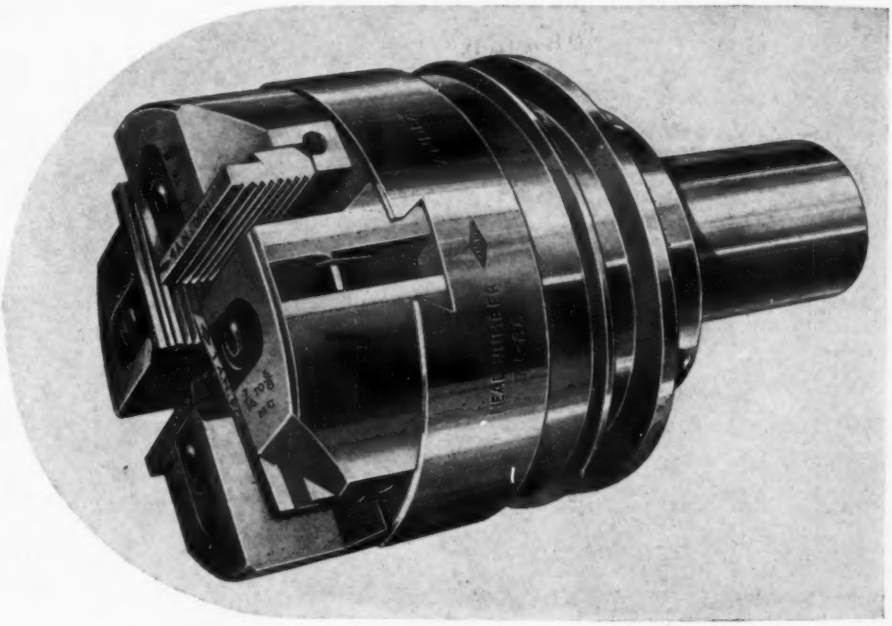
Write for Bulletins

F-90—Heat-Treated

F-80—Hardened and Ground

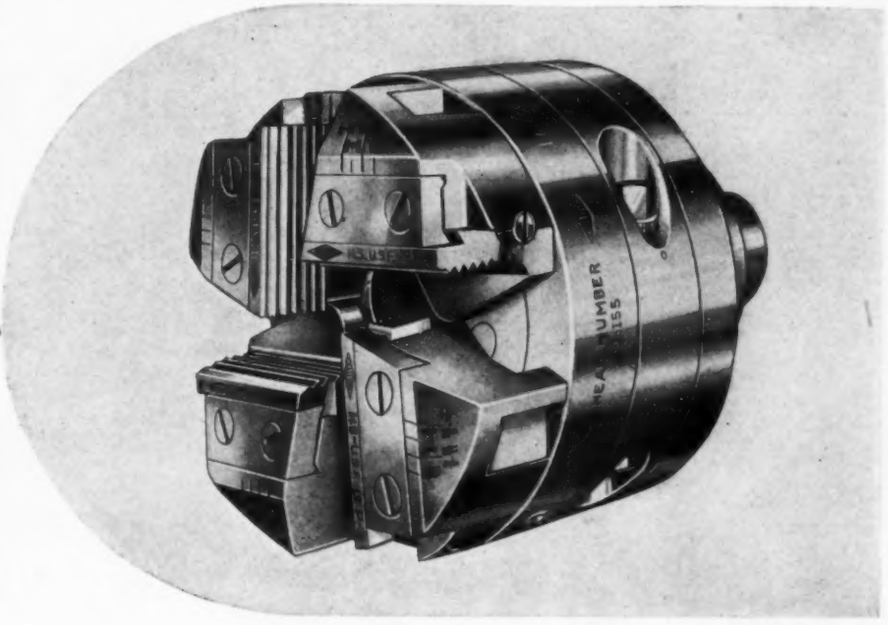


ABOVE: *the LANDEX Hardened and Ground Head.*

LANDEX Heads are built of tough alloy steel, and have the sturdy, rigid construction so essential for tools to be used for threading stainless steel parts on a high production basis.

Free cutting action of the threading tool is of utmost importance when producing threads on stainless steel and other similar materials. The Landis Tangential Chaser, used exclusively in the LANDEX and other Landis Heads, provides the free cutting action which assures smooth finished threads and the long tool life which results in minimum threading cost.

BELOW: *the LANDEX Heat-Treated Head.*



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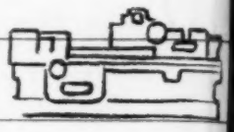
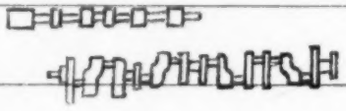
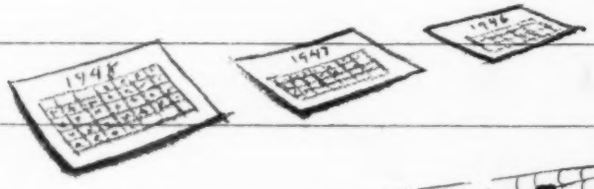
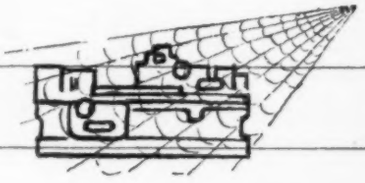
Reports using many **LANDIS TOOL** grinders 

In just one

To precision grind 

All day

Year after year 

Without downtime for spindle bearings 

This tells the secret

And what it can mean to you

Write for Bulletin MB48

LANDIS TOOL COMPANY

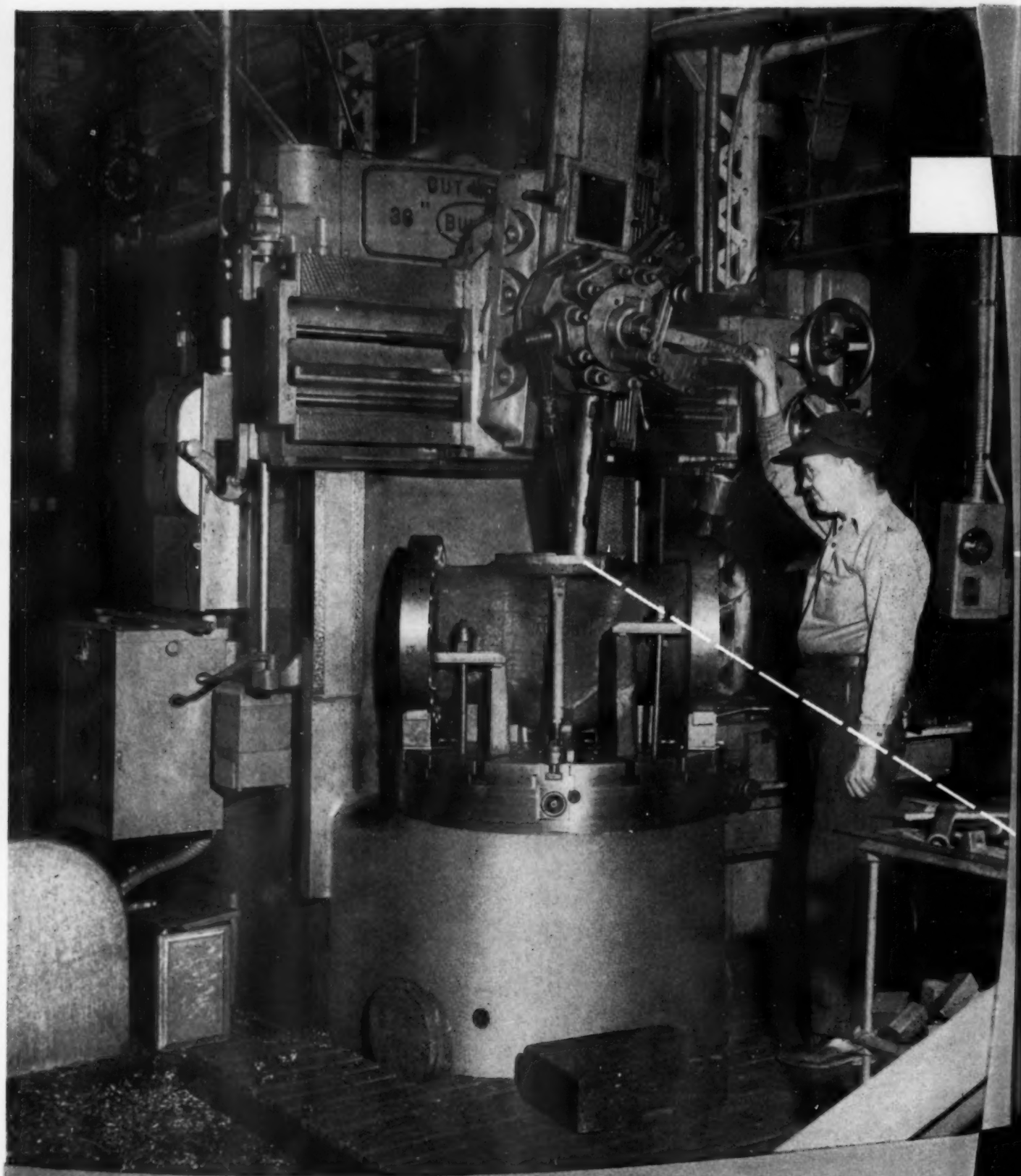
10 E. Sixth Street, Waynesboro, Pa.

96

LANDIS TOOL
Precision Grinders

MICROSPHERE BEARINGS

LANDIS TOOL PRECISION GRINDERS



This BULLARD 36" Cut Master is **"really paying off"** at Newport News Shipbuilding & Drydock Company. Here you see it taper boring a large valve. On this job, it also faces the flange and counter bores, as shown on the cross-sectional drawing. The Cut Master **not only** saved 33⅓% on these three operations **but also** provided such a smooth finish that a grinding operation was eliminated.

BULLARD CREATES

PERFORMANCE REPORT FROM NEWPORT NEWS SHIPBUILDING & DRYDOCK COMPANY

CUTS COSTS 2 WAYS ON CAST STEEL VALVES with a 36" BULLARD Cut Master

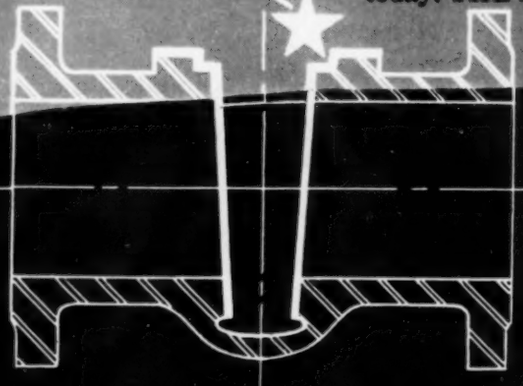
1. SAVED 33⅓% ON 3 OPERATIONS

2. ELIMINATED A GRINDING OPERATION

You, too, can expect savings on most of your jobs. Overall mass weight and rigidity combined with simultaneous cutting of two or three heads, rapid change of speeds and feeds, smooth delivery of power at the point of cutting permit Cut Master V. T. L.'s to take full advantage of the latest in cutting tools. It's easy to see why: The bed is cast in one heavy, rigid piece. Spindle is firmly supported top and bottom by large Timken roller bearings. Screw feeds provide and maintain a high degree of machining accuracy.

OTHER COST-CUTTING ADVANTAGES

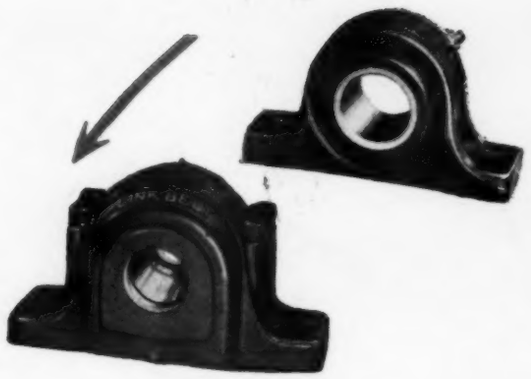
Because the BULLARD Cut Master was designed specifically to save time on and between cuts, you find other unique features. The rapid and positive speed selection with the BULLARD pendant type control, limit-stops for simplified dimensional duplication, and centralized operating controls speed up operations and conserve costs. For complete description of these and other distinctive features, as well as data on feeds, speeds and sizes, write for Bulletin CVTL-4-1 today. THE BULLARD COMPANY, Bridgeport 2, Connecticut.



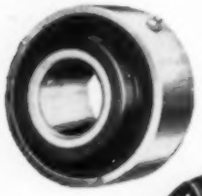
BULLARD

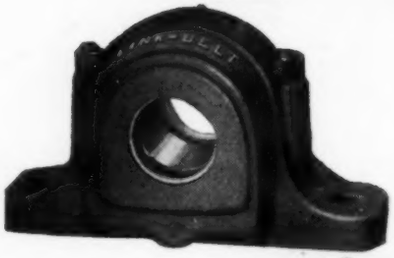
NEW METHODS TO MAKE MACHINES DO MORE

WITH LINK-BELT BALL AND ROLLER BEARINGS *It's*



Operation "OK"





Users everywhere are putting their big "O.K." on the operation of Link-Belt Ball and Roller Bearings. And they report smoother operation of machines equipped with these dependable, precision-built bearing units.

There's a complete line—mounted and unmounted—from which to choose the bearing to fit your job.

Our experienced engineers will be glad to help solve your bearing problems. Once you install Link-Belt Ball and Roller Bearings, you too will enthusiastically say, "Operation O.K.".

11.149

SEND FOR CATALOGS

LINK-BELT COMPANY

519 N. Holmes Ave.
Indianapolis 6, Indiana
Stocks in Principal Trading Areas

LINK-BELT BALL AND ROLLER BEARINGS

Photo courtesy The Astatic Corporation, Conneaut, Ohio

Checking a phonograph precious metal needle cartridge for stylus projection, tip radius and included angle on a Jones & Lamson 14" Pedestal Optical Comparator.

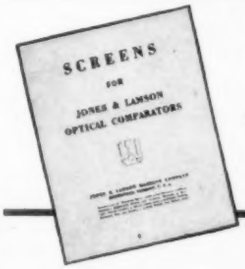
"The only Satisfactory way"

"We find this the only satisfactory way to check such small parts, as the tip radii range from .0028" to .003". In addition other important dimensions can readily be checked."

Says The Astatic Corporation, manufacturer of sound reproducing equipment, who use Jones & Lamson Comparators to help maintain the highest standards of operating efficiency for its products.

Many components and products formerly inspected by slow, tedious methods, that retarded production and drained profits, are now inspected in seconds or minutes on Jones & Lamson Comparators, by operators with only a minimum of instruction. Savings are made all along the line, in gage cost, in time and in overhead.

Our engineers are inspection specialists; their knowledge of holding fixtures, handling methods and suitable Comparator equipment has saved hundreds of thousands of dollars throughout the country. Call, write or wire for their services today.



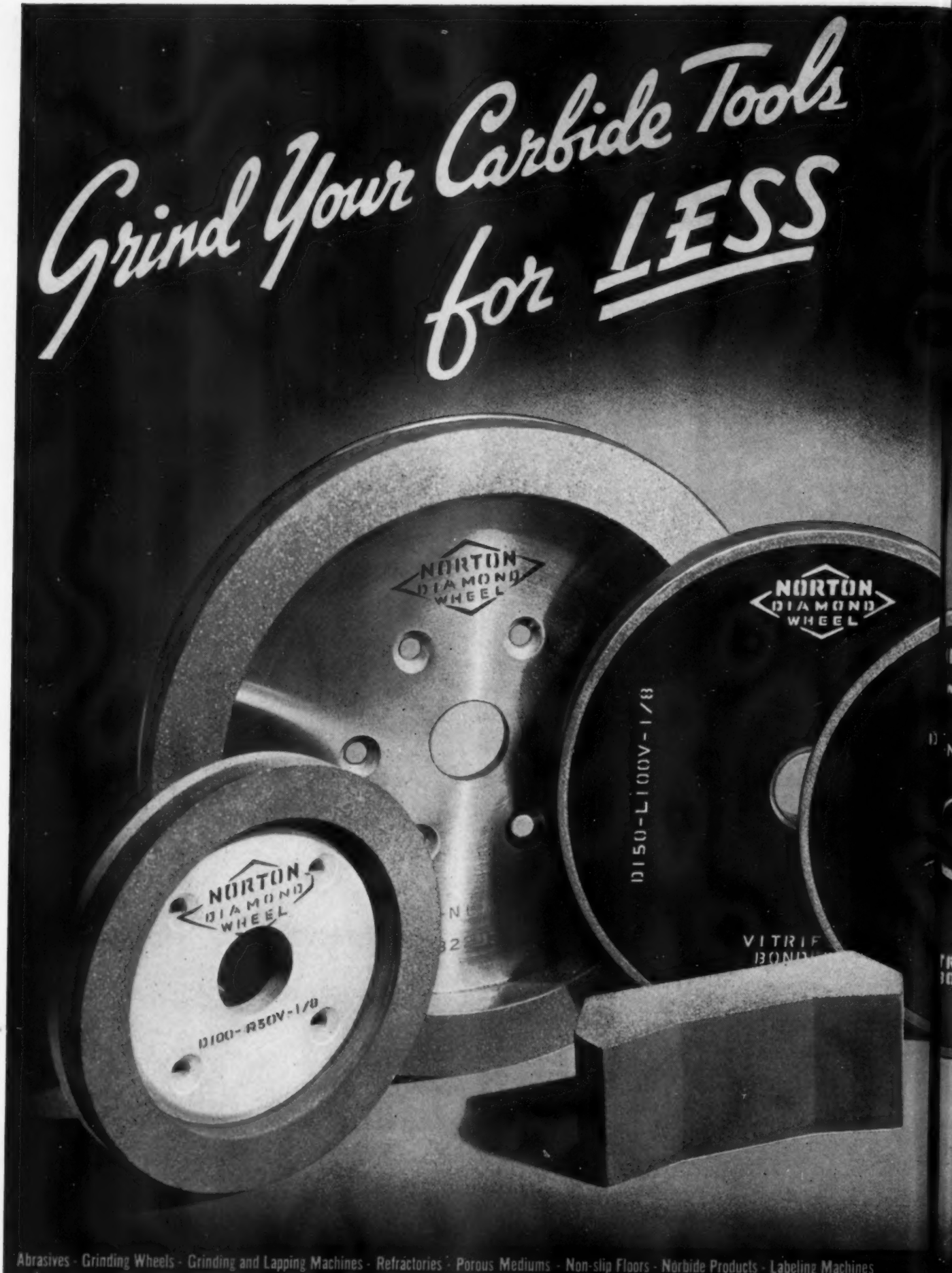
Every owner of a Jones & Lamson Optical Comparator should have this catalog of standard glass screens. Write to Dept. 710 for your copy.

Optical Comparator Division

JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835

Grind Your Carbide Tools for LESS



Abrasives - Grinding Wheels - Grinding and Lapping Machines - Refractories - Porous Mediums - Non-slip Floors - Norbide Products - Labeling Machines

with NORTON *Vitrified Bonded* DIAMOND WHEELS

A fast cutting action *plus* long life — that's what you get with the Norton *Vitrified bonded* diamond wheel — that's why this patented Norton development will enable you to cut costs on many of your carbide tool and die grinding jobs.

For the offhand grinding of single point tools, for the grinding of chip breakers (wheels 1/4" and wider), and for many internal, cylindrical and surfacing jobs you'll find that Norton Vitrified diamond wheels can really cut costs.

Why? Because the vitrified type of bond, used so widely in other Norton wheels, gives a diamond wheel with these outstanding features: (1) a rigidity that gives dimensional accuracy to the work being ground, (2) a porous structure to promote faster and cooler cutting and (3) positive adhesion between the vitrified bond and the diamond grains which insure a long, useful wheel life.

The 138-page Norton handbook "Grinding Carbide Tools" is full of useful information. Write for a copy — no obligation. W-1191

Resinoid and Metal Bonds, too

Because Norton Diamond Wheels are available in all three types of bonds you can be sure of getting the most economical wheel for each carbide grinding job —and impartial assistance from your Norton abrasive engineer or distributor.

NORTON ABRASIVES

NORTON COMPANY, WORCESTER, MASS., New York, Chicago, Detroit, Cleveland, Philadelphia, Pittsburgh, Hartford, Denver, Los Angeles

Where lots are small...
Operations numerous ...
Hole diameter 1½" or less...

HERE'S YOUR MACHINE

FOSDICK SENSITIVE RADIAL

• In developing the first Sensitive Radial FOSDICK have tapped a field that has long been a "problem child".

Built like a radial—looks like a radial—is a radial—but differs from a radial in that it is adapted to high speed sensitive drilling operations.

It features a sturdy one piece column—an arm set at fixed height which may be swung in an arc of 360°—a standard base plus an adjustable table which may also be swung in a 360° arc—a head of simple, sturdy design.

This table arrangement permits locating table in correct position for any job suitable for the machine.

The radial design enables you to handle a wide range of drilling, tapping and similar operations at various center distances—easily—quickly—economically.

Full details of construction—specifications—and operating data is available in the new FOSDICK Sensitive RADIAL bulletin R.S.A. Send for your copy today.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

Sure it's big work for a 20-inch lathe but she does a swell job..."

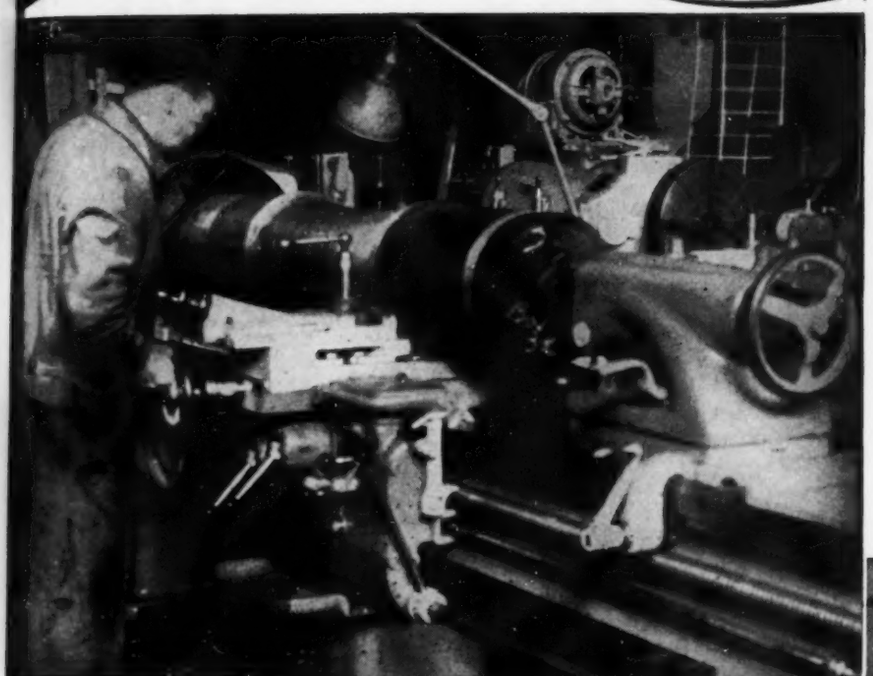
In these few words the superintendent of a prominent railroad shop expressed approval of his "AMERICAN" Pacemaker Lathe.

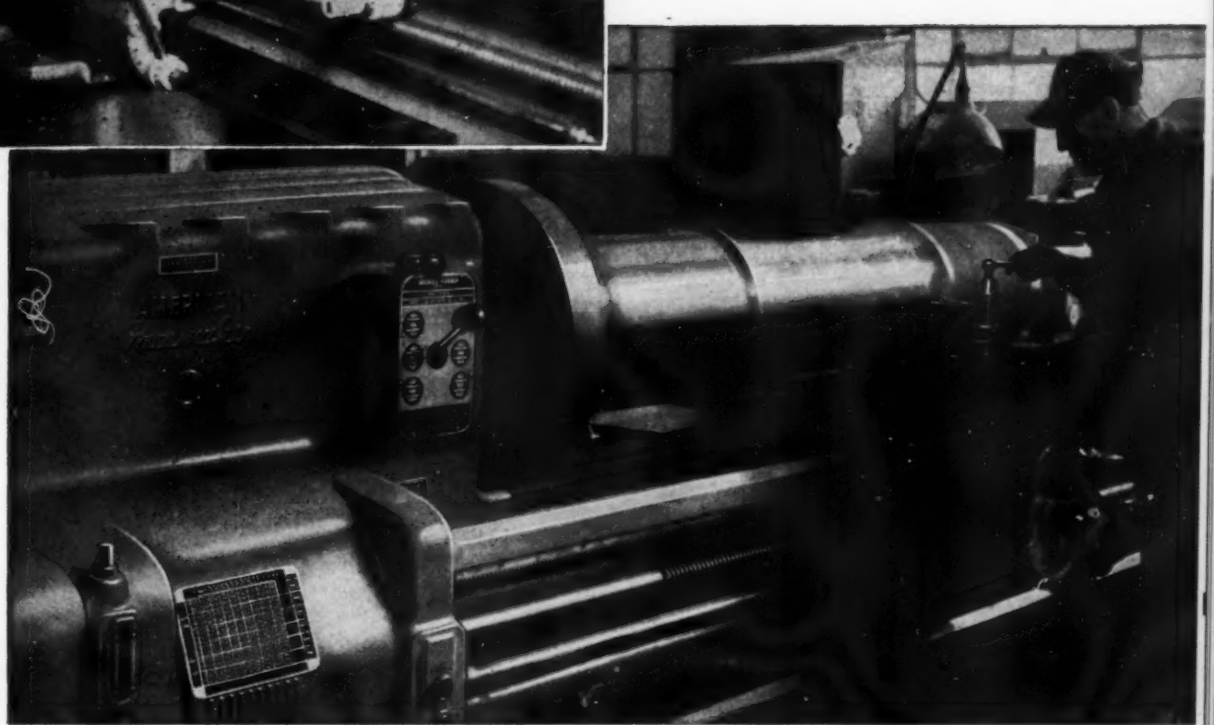
He particularly likes–

1. The power and speeds for using cemented carbide tools to their limit.

2. The ruggedness and stamina which permit large work to be done without chatter.

3. The ease and convenience of control which saves operating time and encourages operator to use correct speeds and feeds.





"American" Pacemaker Lathes are favorites in many of our best railroad shops. They are dependable, low-cost producers. Send for descriptive bulletin No. 16.

"American" Hole Wizard Radial Drills are also doing a fine job for the railroads.

THE AMERICAN TOOL WORKS CO.

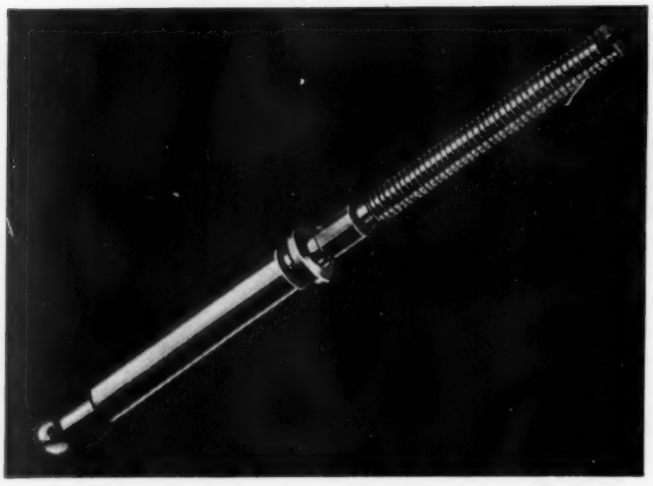
Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

When You Want to Get

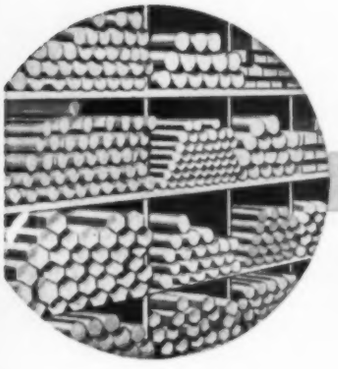
LOWER UNIT COST

And units cost less to service after they leave your plant when they are made from this Stainless. The manufacturer who uses Carpenter Free-Machining Stainless No. 5 (Type 416) for this heavy duty valve part tells customers to "install the valves and forget 'em."



REJECT PROBLEM SOLVED!

Total tolerance of .0001" is held on roundness of the ball, and .0001" concentricity on full length of the thread. The problem of rejected instrument parts has been completely solved... with Carpenter Stainless No. 8 (Type 303).



You Can Turn It Out AT LESS COST with Carpenter Free-Machining Stainless!

WHEN YOU WANT *Rush* DELIVERY CALL YOUR *Carpenter* WAREHOUSE -

BOSTON	CINCINNATI	HARTFORD	PHILADELPHIA
BRIDGEPORT, CONN.	CLEVELAND	INDIANAPOLIS	PROVIDENCE
BUFFALO	DAYTON	LOS ANGELES	ST. LOUIS
CHICAGO	DETROIT	NEW YORK	WORCESTER, MASS.

SEE THE CLASSIFIED SECTION OF YOUR TELEPHONE DIRECTORY

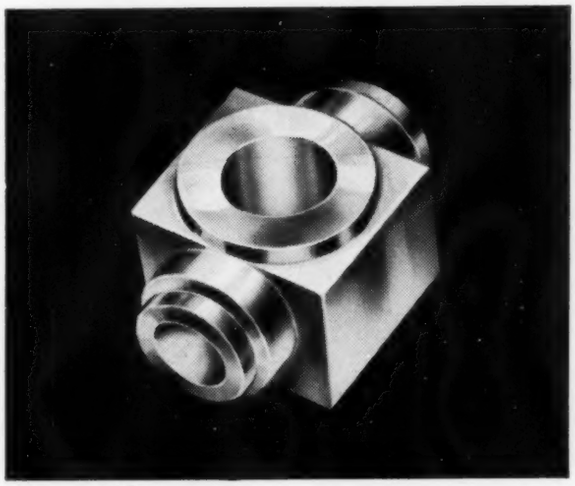
1 MORE OUTPUT PER SHIFT means a lower cost on every Stainless unit you produce. To find new ways to boost output and reduce rejects, use the Carpenter "Notebook on Machining Stainless Steels." It contains over 90 pages of useful shop hints on Turning, Drilling, Reaming, Threading, etc. Make full use of this Carpenter service to Stainless users by writing a note on your company letterhead and indicating your title. We will rush your copy of the NOTEBOOK. Extra copies are available at 50¢ each for the men in your plant.

2 YOU CAN SIMPLIFY YOUR OPERATING PROBLEMS by making use of the complete Free-Machining bar stock inventory carried by your Carpenter warehouse. You can reduce machine down-time, get into production faster, when you order standard sizes from Carpenter. To figure your own savings in doing business this way, call the nearest Carpenter warehouse listed below.

LOWER UNIT COSTS WITH STAINLESS

—Use These 3 Helps *Carpenter* Can Give You!

3 SAVE MONEY ON NEW JOBS by using Carpenter's experience and know-how to reduce the cost of tooling and find shortcuts in production. Ever since the first Free-Machining Stainless bars were invented in Carpenter's laboratory, we have been helping to cut the cost of machining Stainless. When you can use that kind of help, just get in touch with your Carpenter representative.



TOLERANCE IS ±.0001"

On this part containing only 1¢ worth of steel, adding the cost of machining makes each part worth $8. As the manufacturer puts it: "Experience with other materials has convinced us that we get less rejects and better machining time with Carpenter Free-Machining Stainless."

more than corrosion resistance

THE CARPENTER STEEL COMPANY, 109 W. BERN STREET, READING, PA.

Export Department: 233 Broadway, New York 7, N. Y. "CARSTEELCO"

Carpenter

FREE-MACHINING

STAINLESS STEELS

A BUYING GUIDE FOR ABRASIVES

ABRASIVE PROBLEM:

Is the correct abrasive available?

ANSWER BY

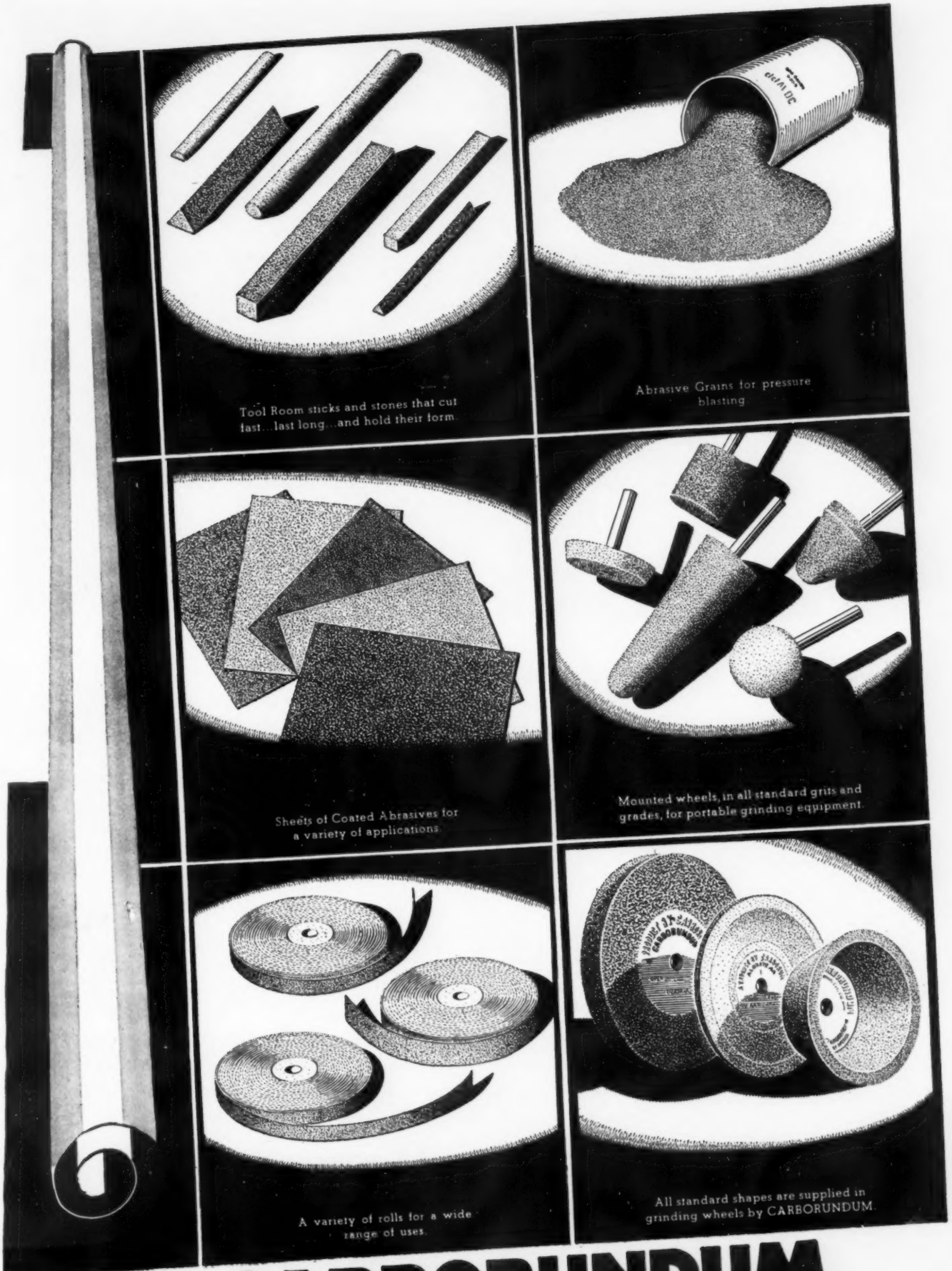
CARBORUNDUM
TRADE MARK

The Carborundum Company produces the only complete line of abrasives under one trade mark. With industrial techniques utilizing a wider variety of different abrasive products, it is only logical to turn to The Carborundum Company as the one primary source of all abrasive needs.

The specialized service of experienced representatives is available to recommend, impartially, the best abrasive products for specific requirements. Product quality is known and highly regarded. Satisfaction is assured. Responsibility is definitely fixed and undivided.

In part, this helps explain the increasing preference for abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.

A Good Rule for Good Grinding


Tool Room sticks and stones that cut fast...last long...and hold their form.
Abrasive Grains for pressure blasting.
Sheets of Coated Abrasives for a variety of applications.
Mounted wheels, in all standard grits and grades, for portable grinding equipment.
A variety of rolls for a wide range of uses.
All standard shapes are supplied in grinding wheels by CARBORUNDUM.

... CALL IN **CARBORUNDUM** TRADE MARK

● BONDED ABRASIVES ● COATED ABRASIVES ● ABRASIVE GRAINS AND COMPOUNDS

At Winter Brothers, we know that prompt delivery on your Taps and Dies is essential. To give you delivery when you need it, your local distributor carries comprehensive stocks of Winter Taps and Dies. In addition, complete stocks are carried at Winter branch warehouses in Detroit, Chicago, and San Francisco, as well as at the Winter factory in Rochester, Michigan. Call on your Winter distributor with confidence, knowing he can supply you promptly.

"Always at Your Service"

YOUR LOCAL DISTRIBUTOR carries a complete stock of Winter Taps on his shelves—as close to your tapping problems as the telephone on your desk.

Winter Brothers COMPANY

ROCHESTER, MICHIGAN, U. S. A. • Distributors in Principal Cities • A Division of the National Twist Drill and Tool Company • Branch Stores: Detroit, Chicago, San Francisco

WINTER

Winter Taps and Dies are made in a wide variety of styles, including hand, chip driver, machine screw, nut, tapper, pulley, and pipe taps—in high speed or carbon steel.

Quality IS BUILT INTO NATIONAL METAL CUTTING TOOLS IN THIS GREAT NEW PLANT

"Call Your Distributor"

LEADING DISTRIBUTORS EVERYWHERE offer complete stocks of NATIONAL Cutting Tools. Call them for cutting tools or any other staple industrial product.

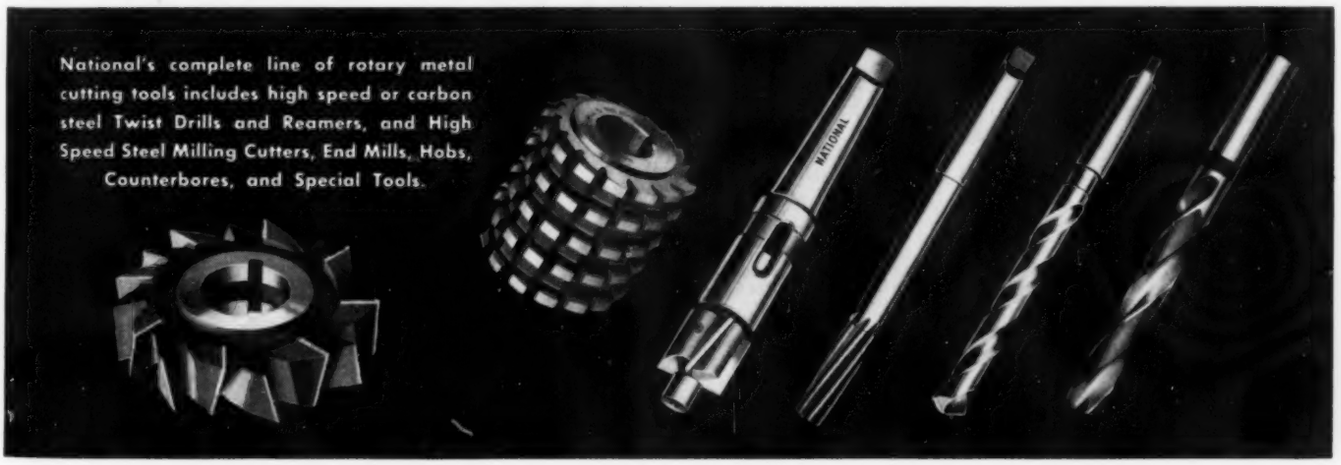
You can depend on the quality of National tools because only the best materials and methods are used in their manufacture. National's great new plant at Rochester, Michigan, is a model of its kind. It combines the most modern manufacturing facilities with traditional engineering skill. Nothing that might contribute to giving you a better cutting tool is overlooked. This is your assurance of better tools and better performance when you buy National Cutting Tools.

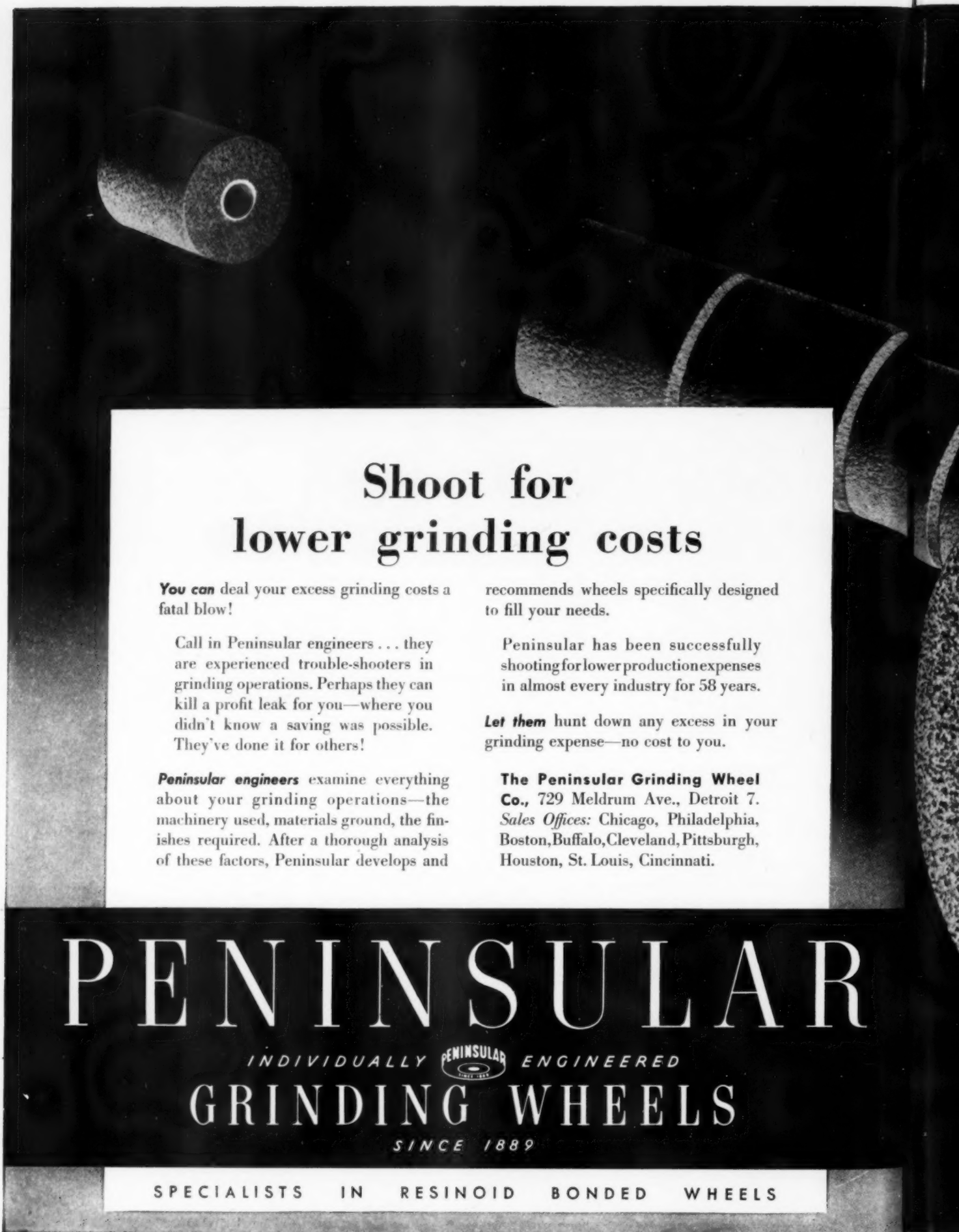
NATIONAL TWIST DRILL AND TOOL COMPANY

ROCHESTER, MICHIGAN, U. S. A. Tap and Die Division—Winter Bros. Co.

Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

National's complete line of rotary metal cutting tools includes high speed or carbon steel Twist Drills and Reamers, and High Speed Steel Milling Cutters, End Mills, Hobs, Counterbores, and Special Tools.





Shoot for lower grinding costs

You can deal your excess grinding costs a fatal blow!

Call in Peninsular engineers . . . they are experienced trouble-shooters in grinding operations. Perhaps they can kill a profit leak for you—where you didn't know a saving was possible. They've done it for others!

Peninsular engineers examine everything about your grinding operations—the machinery used, materials ground, the finishes required. After a thorough analysis of these factors, Peninsular develops and recommends wheels specifically designed to fill your needs.

Peninsular has been successfully shooting for lower production expenses in almost every industry for 58 years.

Let them hunt down any excess in your grinding expense—no cost to you.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

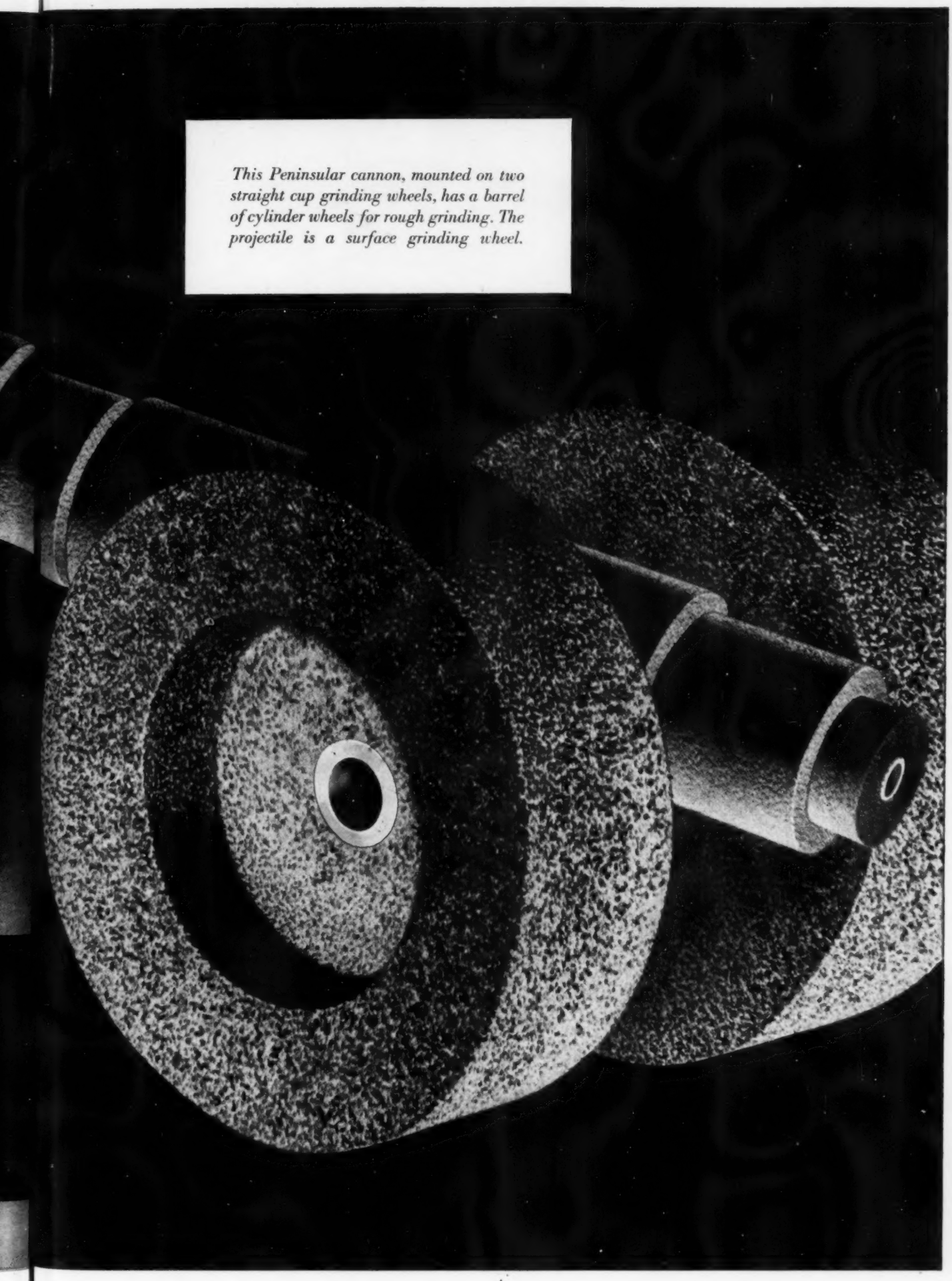
PENINSULAR

INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS

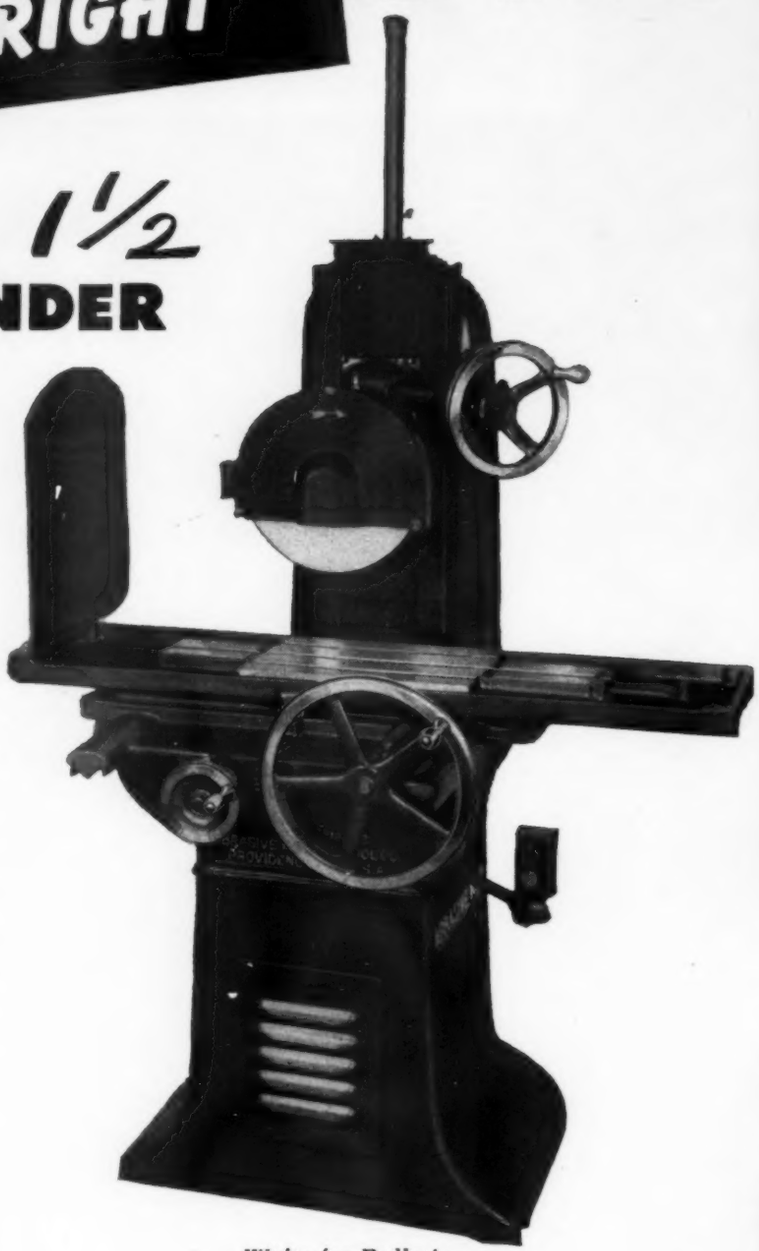


This Peninsular cannon, mounted on two straight cup grinding wheels, has a barrel of cylinder wheels for rough grinding. The projectile is a surface grinding wheel.

BUILT RIGHT

TO GRIND RIGHT

ABRASIVE 1½ SURFACE GRINDER



1 MOTORIZED, CARTRIDGE-TYPE SPINDLE: Entire output of 1 H.P. motor drives the 12″ wheel directly through spindle carried on precision bearings . . . affords maximum cutting power with minimum deflection and vibration. No belts, sprockets, or chains. Dynamically and electrically balanced.

2 LONG WAYS — LARGE SADDLE: Adequate support for workpiece weight at all positions. Eliminates distortion due to unsupported weight at ends of table travel. Properly lubricated for life-long accuracy. All scraped ways fully guarded against grinding dust.

3 HANDY CONTROLS: All controls conveniently located. Fast acting table travel speeds production — without fatiguing the operator. Downfeed by handwheel graduated to .00025″ gives sensitive vertical adjustment.

4 SIZED RIGHT FOR EVERY TOOLROOM: Designed and built from the ground up as a simple, hand-operated surface grinder of utmost precision. Takes work up to 15″ long, 10″ wide, 12″ high. Table overall 48″ x 11¼″. Precision ground table and T-slots assure accurate setups on every job.

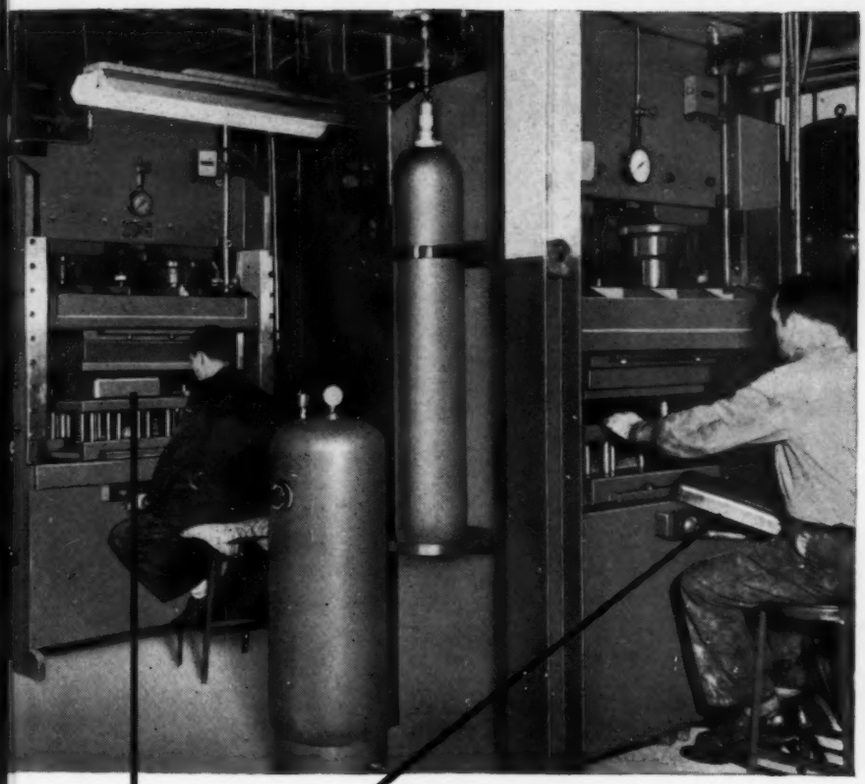
Write for Bulletin

Abrasive Machine Tool Co.
EAST PROVIDENCE 14, RHODE ISLAND

ABRASIVE
ACCURACY BOOSTS PRODUCTION

WE BUILD PRESSES FOR THE JOB NOT BY THE TON"

...K. R. Wilson



Metal Equipment Manufacturer uses KRW Presses to do the work of heavier, more expensive equipment...Do it as fast, at greatly

Reduced Cost!

● Many a KRW Press user discovered long ago that a large percentage of forming, drawing and stamping work does not require the use of large, heavy-tonnage presses with their accompanying high initial and operating cost.

Production records, in a variety of industries, show that KRW Presses greatly reduce costs. First investment is very low, operating costs are still lower. In one instance, the purchase price of a KRW Stamping Press was less than the foundation cost for heavier equipment.

KRW Presses are highly flexible...they can be built in varying bed lengths. KRW Presses are available as either Gap, Open End or Closed End Types. Tonnage pressures vary from 25 to 100 tons. Because they are hydraulically operated and not mechanically driven, they are quiet and vibrationless in operation. Platens can be stopped and reversed at any point in their travel.

Let us know your needs...we are fully equipped to engineer our equipment to handle your work. In the majority of cases, we can make delivery in a fraction of the time required for other type presses. Let us hear from you.

ALL TYPES OF DIES. We are equipped to engineer and build dies to meet your specifications. All we need is available technical data, blueprints and, where practical, a sample piece of work. We'll quote prices and delivery date.

● *Illustration shows installation of two KRW 100-ton presses in nationally-known manufacturing plant making 3 and 4 inch draws as shown completed at left.*

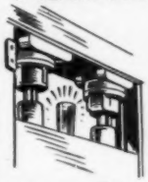
QUIET...

IT WOULDN'T WAKE A BABY. Easy, even hydraulic pressure does the work. No jarring impact as the die bottoms. No shock to the worker to lessen efficiency.

EFLECTION NIL...

NO SWAYBACK PLATENS TO WORRY ABOUT. Where pressures require it, bed rails, platens and head are trussed and ribbed to eliminate deflection.

VIBRATIONLESS...



GLASS OF WATER ON THE PLATEN, YOU'LL NEVER SPILL A DROP. That's how evenly pressures are distributed over the unit. That too, is another reason why dies last longer in a KRW.

AME YOUR NEEDS...WE'LL QUOTE PRICE
ND QUICK-DELIVERY DATE...MAIL TODAY

K·R·WILSON

15 MAIN ST. · BUFFALO 3, N. Y.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please Send me complete information on new KRW 100-ton Hydraulic Presses.

Name .....

Address .....

City and Zone ..... State ....

ALL HOLES
PIERCED EVERY
7 SECONDS

HYDRAULIC HOLE PIERCING SYSTEM

speeds refrigerator door production

For example, Vulcan's Hydraulic and Electrically controlled Piercing System perforates all holes in the flange of a refrigerator door every seven (7) seconds. Frees four (4) punch press operations, eliminating multiple die costs, labor and maintenance. Quickly adjusted for any door sizes, lefts or rights. One operator. No punch presses needed.

Increases Production
Saves floor space
Frees presses for
other work

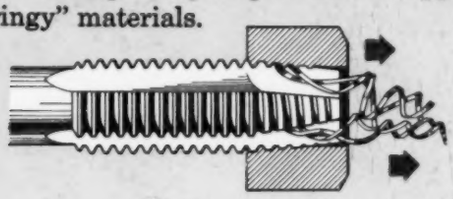
The hydraulic principle for Die Operation can be utilized in many forming and piercing applications. Upon receipt of your product part prints we will gladly advise and quote. No obligation.

Vulcan Tool Co.
DAYTON 10, OHIO, U. S. A.
COMPLETE TOOLING PROGRAMS

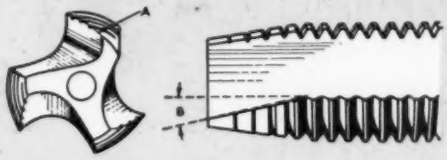
Facts about "GUN" TAPS

In the old days, most taps broke before they wore out.

Then, for machine use, GTD "Greenfield" brought out the "Gun" Tap – a radical change in tap design. The "Gun" Tap "shot" the chips out ahead of the tap so that they didn't clog up in the flutes. This was especially important in tapping "stringy" materials.

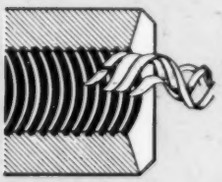


Note the design features of the "Gun" Tap in the illustration below. Cutting edges (A) at the point of the tap are ground at an angle (B) to the axis for four or five threads. This angle, plus a hook on the cutting edge of the land and the special flute form – makes long curling chips that shoot out ahead of the tap.



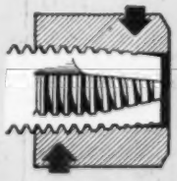
RESULT: a "Gun" Tap does not require deep flutes for elimination of chips. Therefore, fewer and shallower flutes are possible, insuring a large cross sectional area. This gives **EXTRA STRENGTH.**

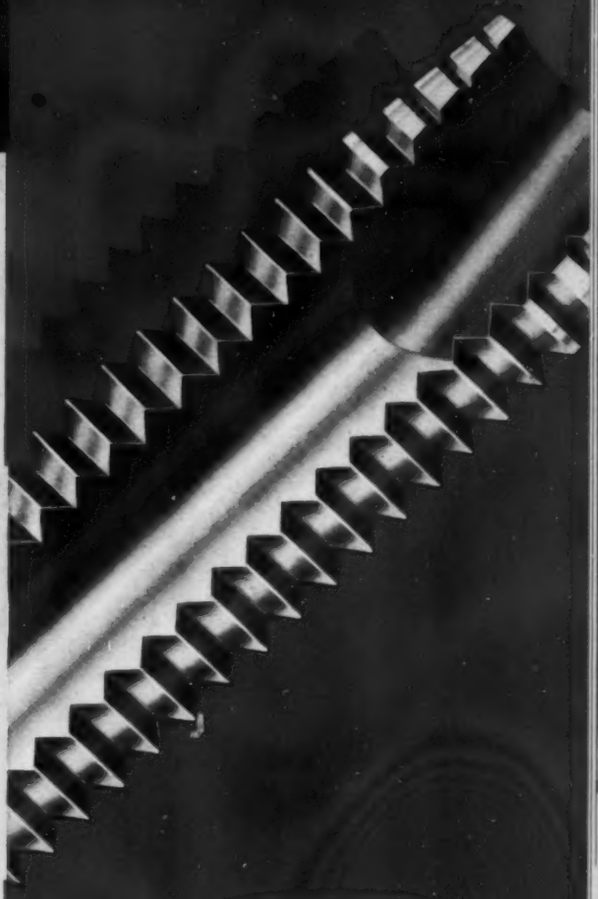
"GUN" TAP 4 FLUTED HAND TAP



And much **LESS POWER** is needed to drive the tap because it shears the metal instead of tearing or pulling it off with a scraping action.

Also a "Gun" Tap gives greater **ACCURACY** because the first few teeth do the cutting so that the rest of the threads can serve to steady the tap in the hole.





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When you buy GTD "Greenfield", you get a quality of product that comes from the world's largest, most modern threading tool plant and its research staff of threading engineers – PLUS SERVICE from the leading distributors and GTD "Greenfield's" field men in every industrial center.

GREENFIELD TAP and DIE CORPORATION GREENFIELD MASSACHUSETTS

Precision THREADING TOOLS

GEOMETRIC

STYLE DS Convertible Self-Opening DIE HEAD

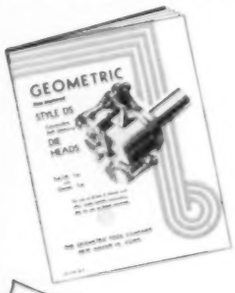
Here is precision plus!

Geometric's famous new improved Style DS Convertible Self-Opening Die Head offers precision threading in not just one, but in 4 different ways.

This versatile tool can be used as a (1) Pull-off Trip for automatics, (2) Outside Trip for automatics, (3) Pull-off Trip for hand machines or (4) Outside Trip for hand machines. The changes can be made quickly and easily without removing the head from the machine and without the necessity of getting new parts or removing or mutilating existing parts.

Made of special alloy steel, hardened and ground throughout, the DS head is a light but durable tool, designed to give precision performance over a long period of time. Unusually sensitive, the DS is especially recommended for cutting fine pitch threads of short lengths. It operates with perfect ease and accuracy at speeds up to 5,000 R.P.M. The new DS is built in six sizes with a cutting range from 1/16" to 1 3/4", and its chasers are interchangeable, size for size, with the old-style heads. *Write today for the complete free story on this precision plus die head! No obligation of course!*

USE COUPON FOR FREE INFORMATIVE BULLETIN NO. DS-3



THE GEOMETRIC TOOL COMPANY
7 Valley Street
New Haven 15, Connecticut

Please rush me a copy of Bulletin No. DS-3 which describes in detail the new improved Geometric Style DS Convertible Self-Opening Die Head.

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GEOMETRIC
TOOL COMPANY — NEW HAVEN 15, CONN.
A Division of Greenfield Tap and Die Corporation

Give your M.E. his head! Let him show you that handling big castings need not be a backbreaking struggle. A casting that weighs 200 lbs. in iron weighs just 50 lbs. in magnesium—can be *handed* through production without need for trucking or hoisting.

Look for bigger sales with a magnesium-light product, whether it's a vacuum cleaner or a production machine. Easier finishing, too. Your first cut can be your finish cut—to a superlative finish. And look for deliveries on dependable schedules in the quantities you need for full production, with American Magnesium products.

Encourage your M.E.! Or, if you haven't one in your shop, we'll be glad to send one of ours. ALUMINUM COMPANY OF AMERICA, sales agent for American Magnesium products, 1709 Gulf Building, Pittsburgh 19, Pennsylvania.

*M.E., in this case, means Magnesium Enthusiast, and Mechanical Engineer as well. He's probably young, may have joined you since the war. He knows from experience the powerful appeal of American Magnesium parts: castings 75% lighter than iron, 35% lighter than aluminum. He knows the economics of magnesium which makes his recommendations practical.

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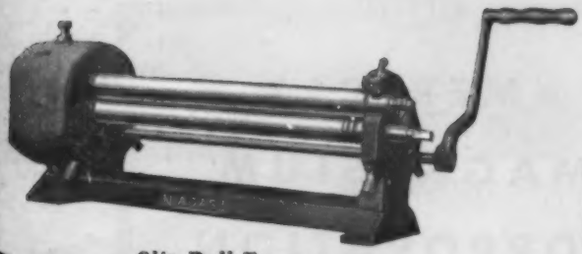
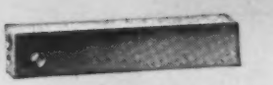
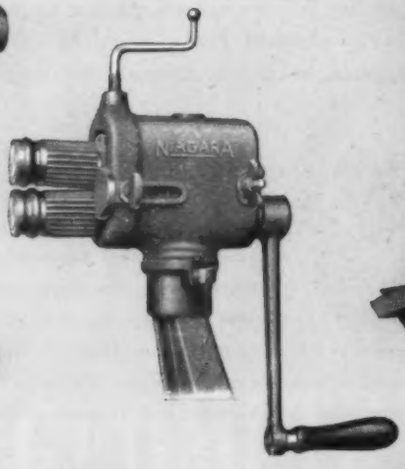


Slip Roll Former

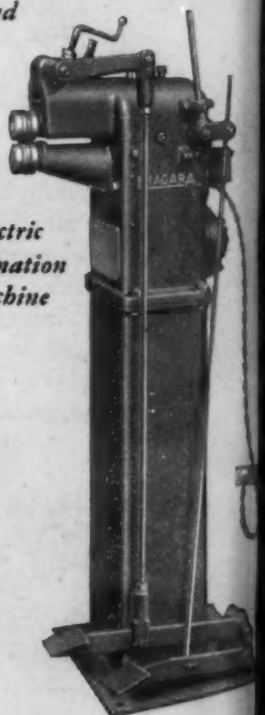
Hand Groovers



Rivet Sets and Headers



Crimper and Beader



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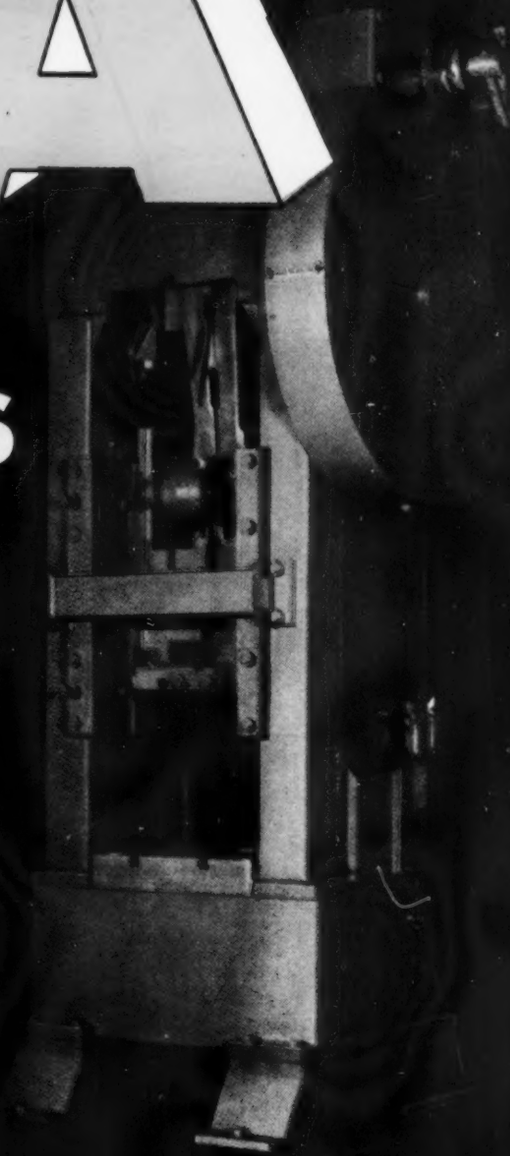

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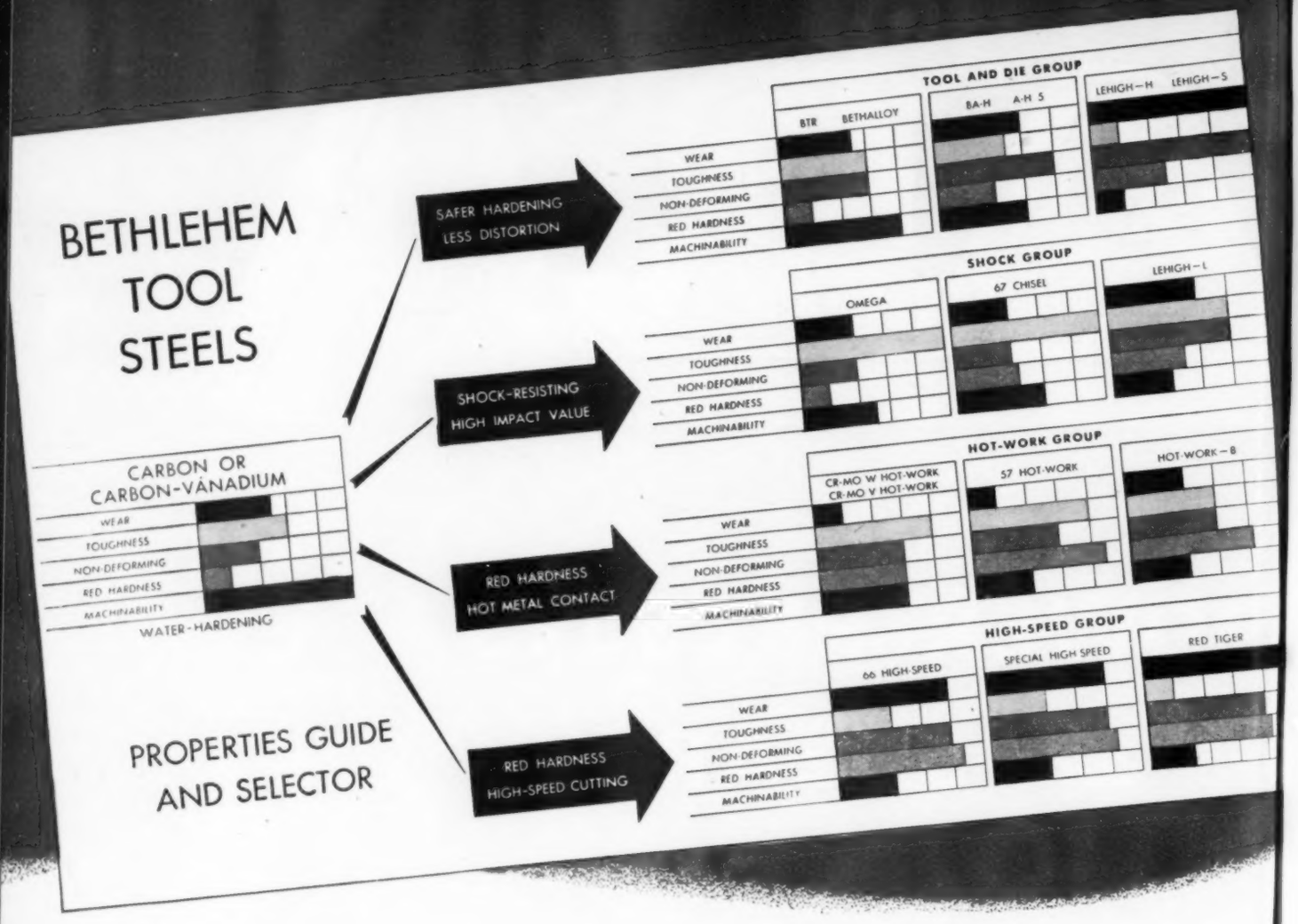

PROPERTIES GUIDE and SELECTOR OF Bethlehem Tool Steels

The properties guide and selector shown above was originally prepared to assist our own sales organization . . . and they have found it so useful that we present it here.

The length of each bar indicates the high or low relative values of the characteristics of each steel. For example, the long "toughness" bar for Omega shows excellent toughness, while the very short "red-hardness" bar indicates relatively poor red-hardness. The grades of tool steel are arranged in the order of increasing wear-resistance from left to right in each group.

If you'd like to have one of these charts, printed in six colors, together with condensed information on the various grades of Bethlehem Tool Steels, we'll be glad to send it to you promptly. Address our Publications Department, Bethlehem, Pa.

There are Bethlehem tool steels for every job. Deliveries are prompt, and our metallurgical staff is always ready to work with you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
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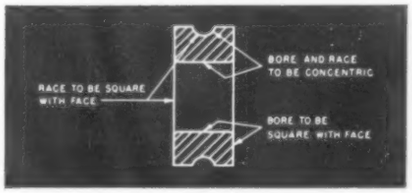
BETHLEHEM STEEL

What's in VERMONT *this month?*

GRINDER COMBINES 3 OPERATIONS FOR BETTER QUALITY PRODUCT. Major problems in production grinding are encountered in maintaining *relationship specifications* as well as *dimensional specifications*. For instance, in grinding an inner race for a ball bearing, dimensional specifications of the bore could be ground on a standard internal grinder; the O.D. raceway on a cylindrical grinder; the face on a surface grinder. Each machine will hold dimensions to required tolerances. But, for precision classification, inner races must also depend on the relationship of these surfaces — the bore and raceway must be concentric, and the face and raceway must be square with the bore.

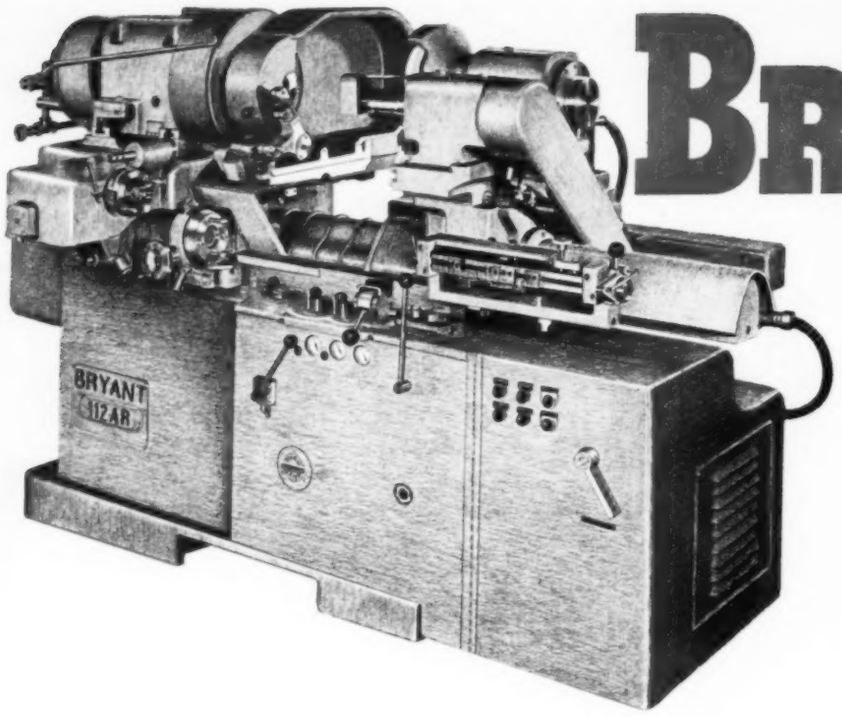
Bryant Chucking Grinder Co., Springfield, Vermont, has developed a grinder to finish all three surfaces at one chucking. The grinder has two wheelheads. The first wheel finishes the bore. The workhead moves to the second wheel which finishes the face and raceway. Dimension and relationship specifications are controlled on the machine.*



This is an example of how machine-tool builders are making every effort to reduce machining and handling costs and increase the quality of finished products for the metal working industry. . . . It won't cost to inquire.

**A short 16 mm sound and color film on this type of machine is available for showing on request.*

Bryant Chucking Grinder Co., Springfield, Vermont, U.S.A.



BRYANT

Number 112-AR

HYDRAULIC INTERNAL GRINDER

The Bryant No. 112-AR (used for the job described on reverse side of this page) is a special-purpose, two-spindle grinder for maintaining precise relationship tolerances required on work where concentricity and squareness are important factors.

SPECIFICATIONS

Total swing	16 inches
Maximum traverse	20 inches
Maximum hole depth	9 inches
Will grind included angle	90°
R.P.M. of work spindle	100 to 1,000 R.P.M.
Net weight	5,500 lbs.

Floor space — 99 inches x 85 inches (including coolant tank)

SLIDES
Wheelheads on Bryant cylindrical slide; workhead (for cross feed) on anti-friction bearings.

WORKHEAD
Precision ball bearing spindle. Infinitely variable and reversible spindle by hydraulic motor. Standard cam lock spindle nose.

WHEELHEADS
Belt driven or electric wheelheads available.

TRAVERSE
Hydraulic, infinitely variable.

CROSS FEEDS (ONE FOR EACH WHEEL)
Independent variable speed automatic feed for each wheelhead.

BRYANT INNER RACE BALL BEARING GAGE to check three specifications — A. Diameter of Raceway. B. Squareness-of-face with raceway. C. Concentricity of I.D. and raceway. A fast, visual check for relationship of finished surfaces.

You can *"See the Difference"* with a BRYANT GAGE

It is no longer necessary to "feel for fit" with plug and ring gages when inspecting threads. The Bryant Thread Gage shows, on a dial indicator, whether a thread will assemble properly with its component.

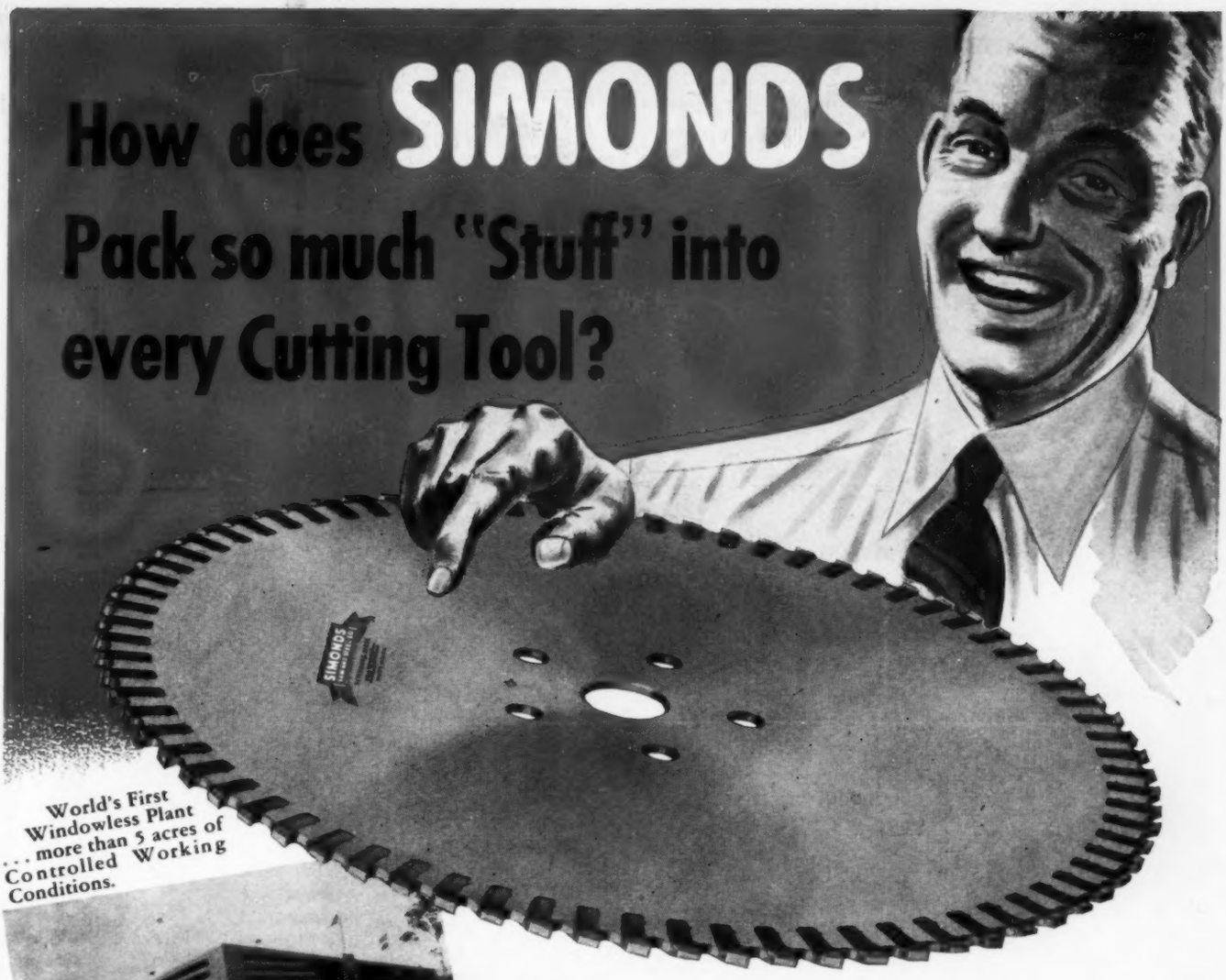
At a glance, anyone can compare threaded parts with a master and tell the whole story immediately — size, presence of burrs, out-of-roundness, accumulated inaccuracies of pitch, lead, diameter and thread form.

It's fast too. The design incorporates three thread segments, two stationary and one movable. The segments are operated by a thumb lever — the part is dropped between the segments — the lever is released, causing immediate contact of segments to threads — a one third turn of the part inspects it all over.

Send samples or drawings for a complete story on how Bryant can save inspection money for you.

Bryant Chucking Grinder Co., Springfield, Vermont, U.S.A.

How does SIMONDS Pack so much "Stuff" into every Cutting Tool?



World's First Windowless Plant . . . more than 5 acres of Controlled Working Conditions.

Simonds' Own Steel Mill guarantees the unmatched quality and uniformity of Simonds cutting edges.

Co-operative Resources of 4 Simonds Companies assure service unequalled in the field of cutting-tool manufacture.

Here are 6 Quick Answers

to this Often-Asked Question about SIMONDS SAWS, KNIVES and FILES

1. **Longest experience** . . . 115 years. Long experience per man . . . Simonds craftsmen *stay* with Simonds.
2. **World's First Windowless Plant** . . . air, light, sound completely controlled for better work, higher product-quality, faster delivery.
3. **Simonds Steel Mill** . . . Modern electric furnaces, under close laboratory control, pour all Simonds special cutting-tool steels.
4. **Simonds Own "Sharpeners"** . . . Simonds organization includes a top producer of grinding wheels . . . part of the secret of Simonds famous "Mirror Finish."
5. **Simonds Research:** New metals, methods, and cutting tools . . . these come *first* from Simonds.
6. **Simonds 4-Company Organization:** All quality controlled from raw material to *you.*

That's why Simonds Tools cut *your* cutting costs. Order from your Distributor.

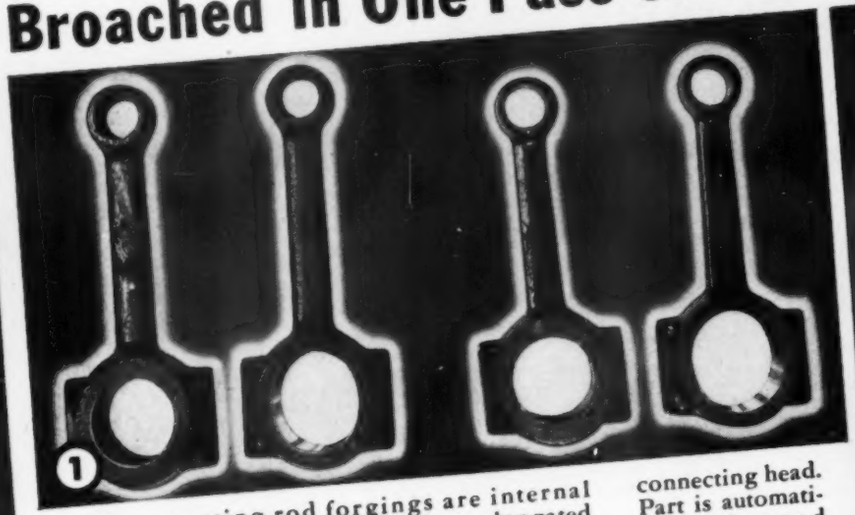
BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green Street, Chicago 7, Ill.; 416 W. Eighth Street, Los Angeles 14, Calif.; 228 First Street, San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Washington. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

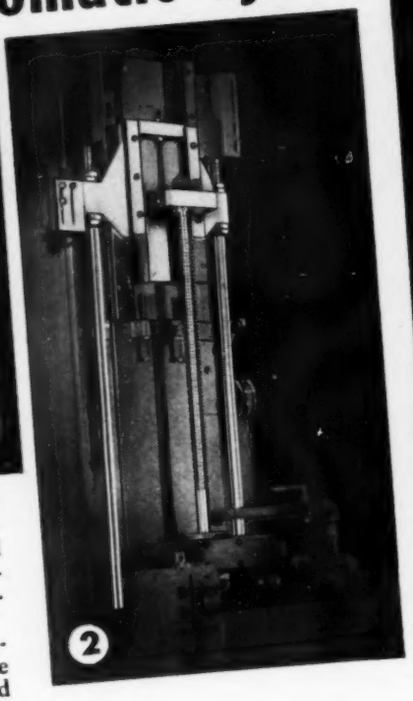
When you use SIMONDS You stay in the Highlands

OF CONSISTENT CUTTING EFFICIENCY

A TIP TO
TOOL ENGINEERS

Elongated Hole in Small Connecting Rod Broached in One Pass on Automatic Cycle





Small connecting rod forgings are internal broached at the crank end to provide an elongated hole held in relation to a previously reamed wrist pin hole.

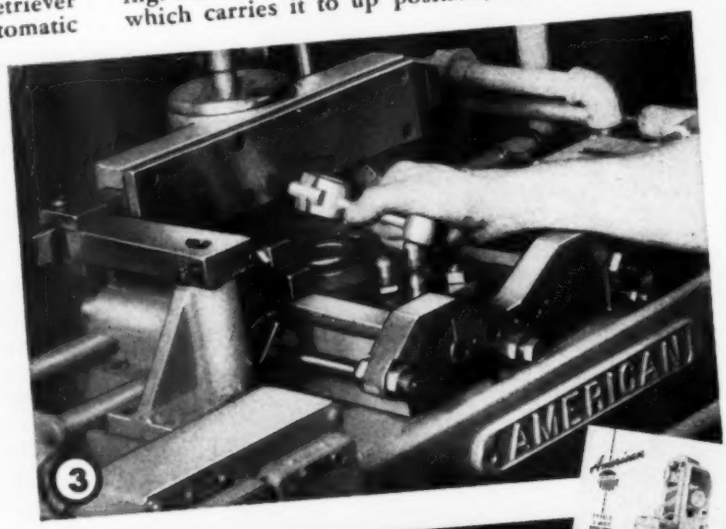
American engineers tooled up a T-10-36 3-Way Broaching Machine with a hydraulically operated fixture, special guided broach retriever, and an automatic work clamp to prevent lateral movement of part during the broaching stroke.

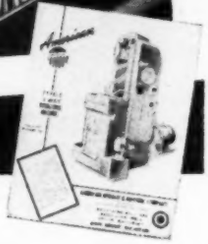
In operation, part is loaded with location taken from wrist pin hole and bolt bosses. Machine cycle is started by dual push button controls. The fixture moves into broaching position; retriever unit lowers broach through work into automatic connecting head. Part is automatically clamped prior to engagement of first cutting tooth.

Broach retriever slide guides rear end of broach during principal portion of stroke. At end of broaching stroke, part is automatically unclamped and fixture recedes for unloading. Main machine slide returns broach to retriever which carries it to up position, completing cycle.

★ ★ ★

Above: 1) Two sizes of air compressor steel connecting rod and cap forgings, before and after broaching on *American* 3-Way. The 1.158″ drilled hole in crank end of part is finished to 1.206″ width, elongated 3/32″. Approximately .010″ stock is left on radius for a boring operation after cap is parted off rod by slitting. 2) View of special guided broach retriever which provides broach with guided support during principal part of broaching stroke. 3) Loading slide is designed to allow loading clear of center line of broach. Part is clamped and unclamped automatically.





FREE CIRCULAR ON 3-WAY MACHINE—Full specifications on *American* 3-Way Broaching Machines are given in a new circular. Send for your free copy today and learn how this versatile machine is used for a variety of broaching operations. Just ask for Circular **100A.**

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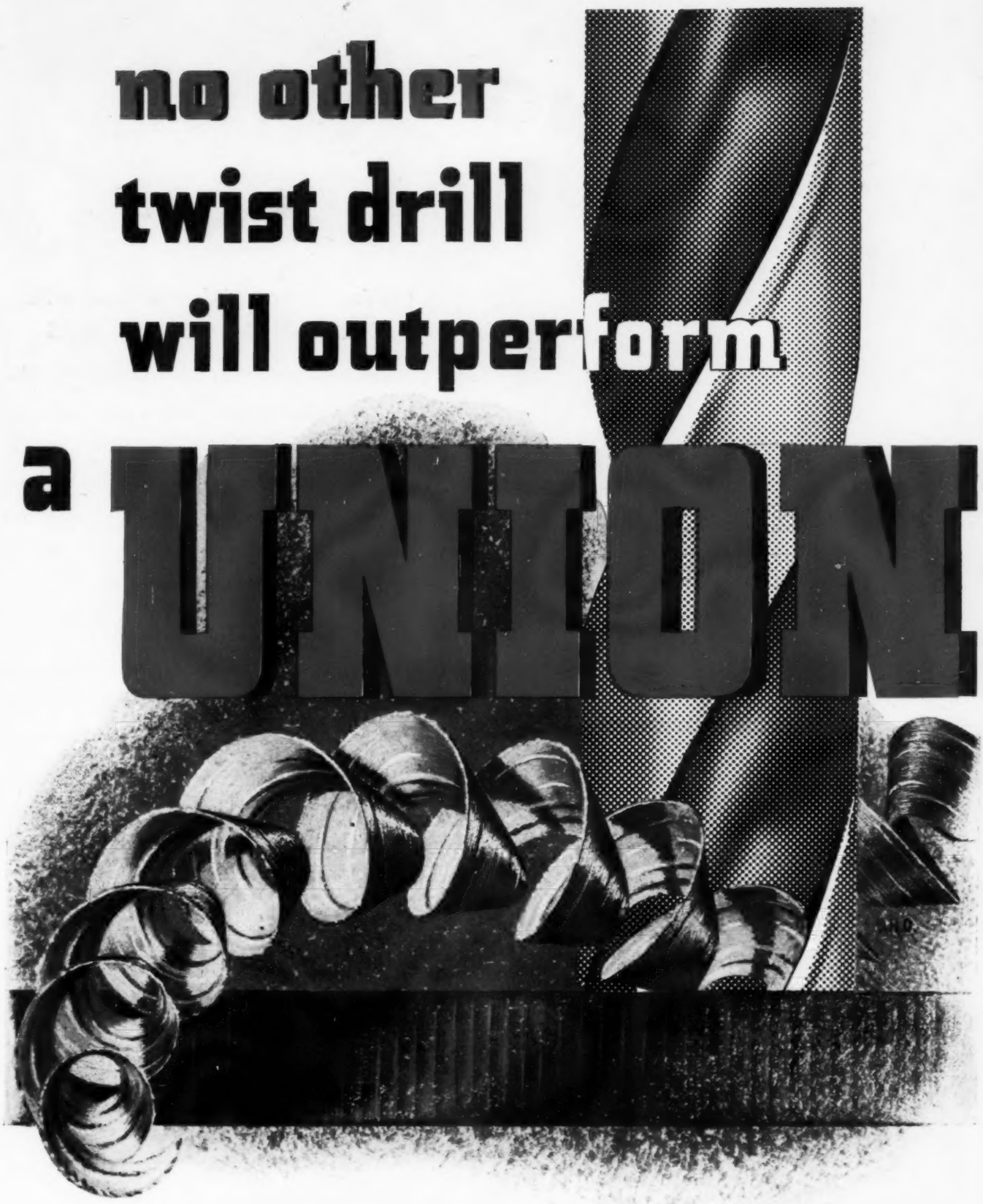

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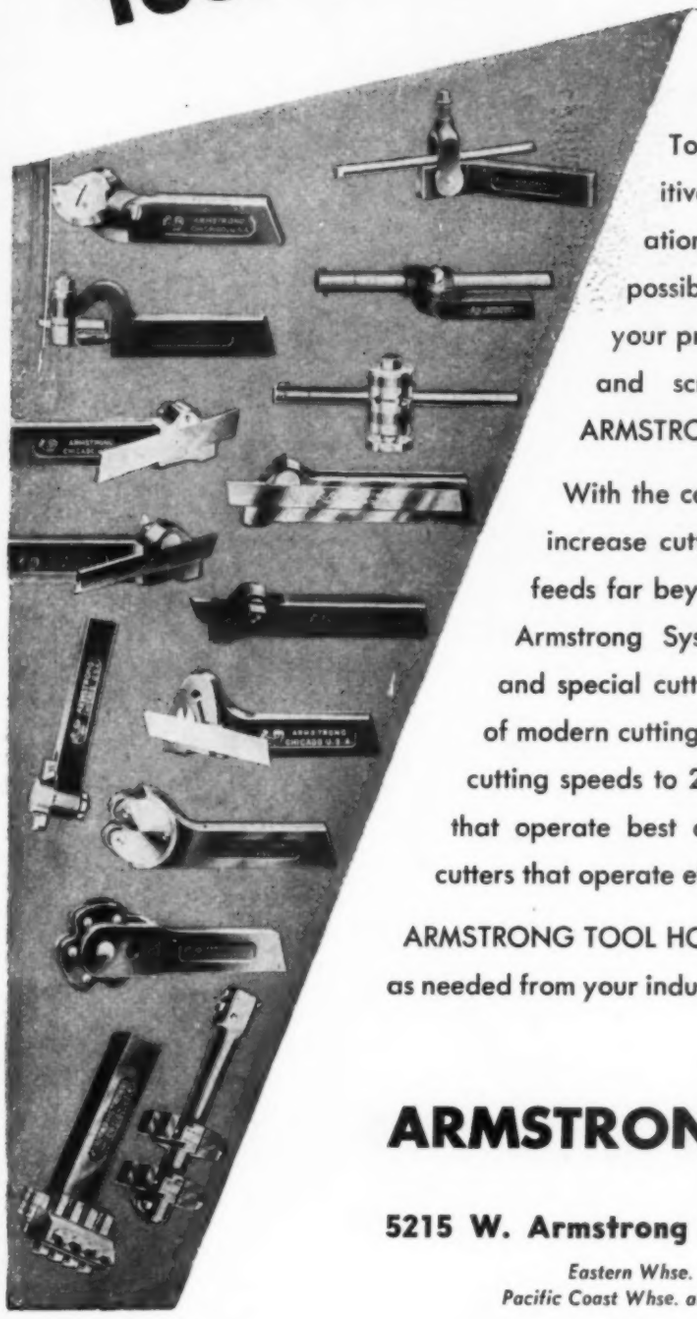
ARMSTRONG TOOL HOLDERS



Produce more at lower cost with ARMSTRONG TOOL HOLDERS

Today's problem of producing more without prohibitive costs is easily answered on many machining operations by the Armstrong System of Tool Holders. It is possible to materially increase output per man hour on your present lathes, planers, slotters, shapers, turret lathes and screw machines, by simply using the correct ARMSTRONG TOOL HOLDER for each operation.

With the correct ARMSTRONG TOOL HOLDERS you not only increase cutting efficiency but can safely step up speeds and feeds far beyond those ordinarily used. Included in the modern Armstrong System are special ARMSTRONG TOOL HOLDERS and special cutter bits and blades that cover the complete range of modern cutting speeds. ARMSTRONG HIGH SPEED cutters for all cutting speeds to 200 f.p.m., ARMALOY (Cast alloy) Bits and Blades that operate best around 300 f.p.m. and ARMIDE (carbide-tipped) cutters that operate efficiently at rates as high as 600 f.p.m.

ARMSTRONG TOOL HOLDERS, Bits, Blades and Cutters, can be picked up as needed from your industrial distributor.

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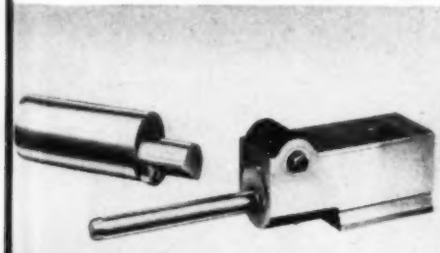
with this UNIQUE *Electronic* MEASURING EQUIPMENT

ADVANCED design and construction features make this Brown & Sharpe Measuring Equipment unusually fast, accurate and dependable. Its separate amplifier, for example, completely isolates heat-producing elements . . . thus prevents temperature drift in gaging units. Its true linear response permits accurate setting for the entire scale with only one master block. A single amplifier may be used to serve several separate testing instruments. Line voltage fluctuations within the range of 105 to 125 volts do not affect readings.

These and other advantages make precision gaging on a mass-production basis both practical and economical for any plant or laboratory. Get all the facts about this unique Electronic Measuring Equipment. Write Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor



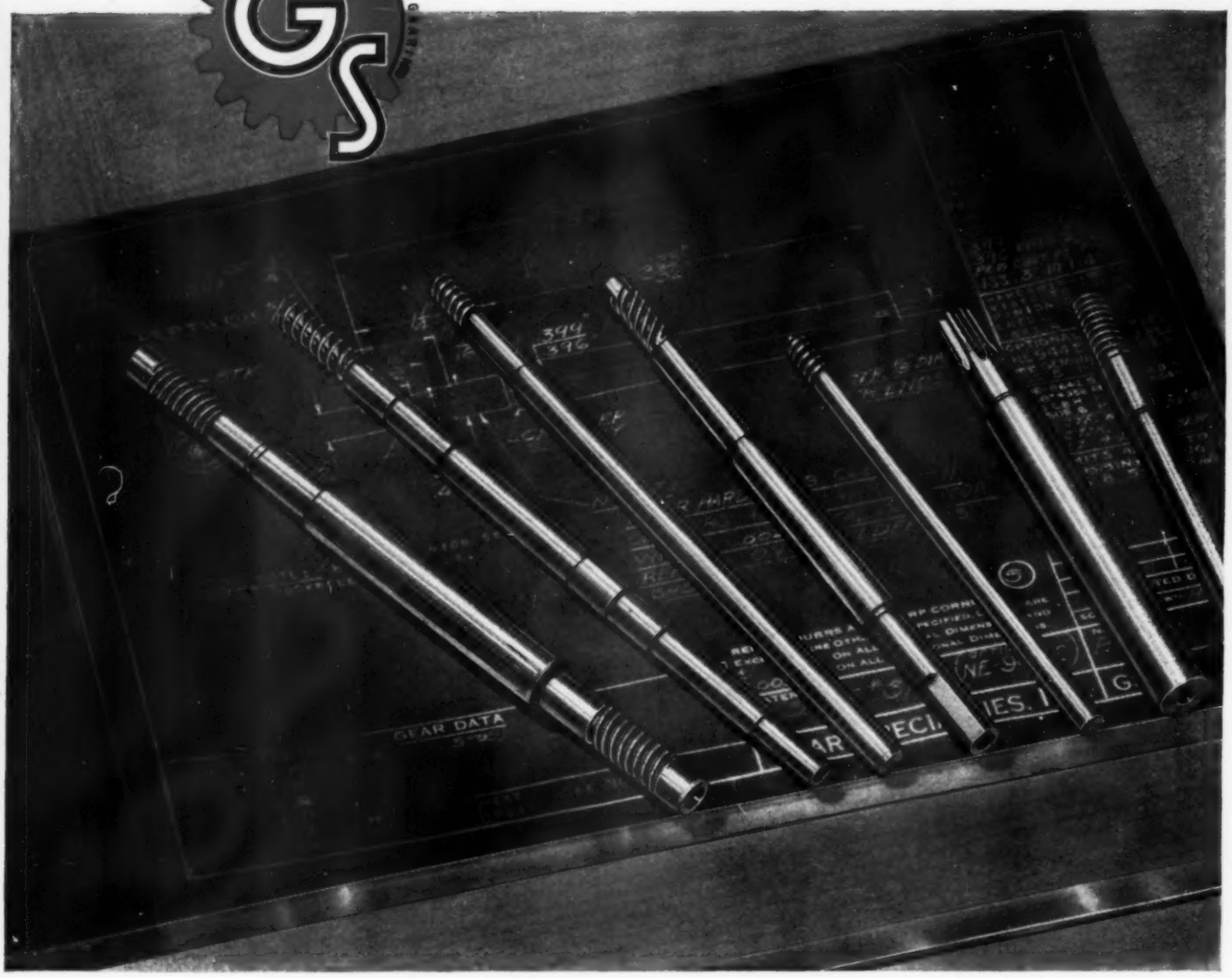
Speedy Internal Gaging from ½" to 2" is provided by Internal Comparator Attachment No. 952. For use with External Comparator No. 951.

Extremely Accurate Gaging (.0001" to .00001") in stands, jigs and fixtures is offered by Gage Head Cartridge No. 953. Plugs in directly to Amplifier No. 950.

Visual Indication of work conditions show quickly on Signal Light Attachment No. 958. For use with Amplifier No. 950. Easily attached.

BROWN & SHARPE

FRACTIONAL HORSEPOWER GEARS



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- STATIONARY SELF-OPENING DIE HEADS
- ROTARY SELF-OPENING DIE HEADS
- STATIONARY COLLAPSIBLE TAPS
- ROTARY COLLAPSIBLE TAPS
- MODERN-MAGIC CHUCKS AND COLLETS
- SELF-OPENING STUD SETTERS
- INSERTED BLADE FACE MILLING CUTTERS
- SOLID ADJUSTABLE DIE HEADS
- ADJUSTABLE HOLLOW MILLING TOOLS
- UNIVERSAL CHASER GRINDING FIXTURES

The set-up shown above is typical of the increased production obtainable using Modern-Magic Quick Change Chucks and Collet Equipment. Here, the two spindles of the machine, Modern-Magic equipped, perform four separate operations. The tools are quickly and easily changed while the machine runs at operating speed. You don't even have to slow it down.

Simple, advanced design makes Modern-Magic Chucks and Collets practically trouble-free. Sturdy, fool-proof construction insures longer, accurate service.

Try Modern-Magic Quick Change Chucks and Collet Equipment on your next close-figured job. Prove their higher production, lower cost operation to your own satisfaction.

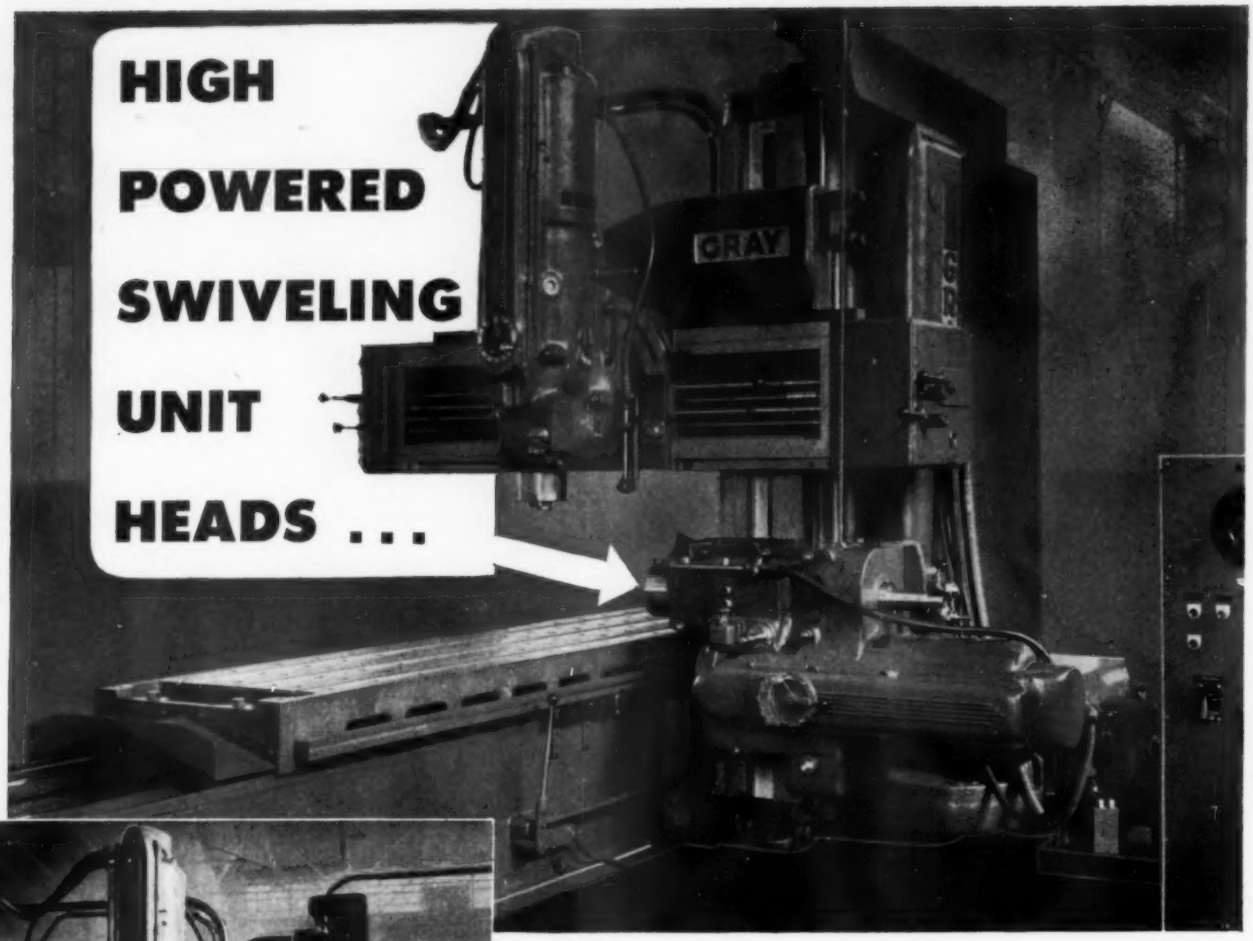
Write for full information covering Modern-Magic Quick Change Chucks and Collet Equipment

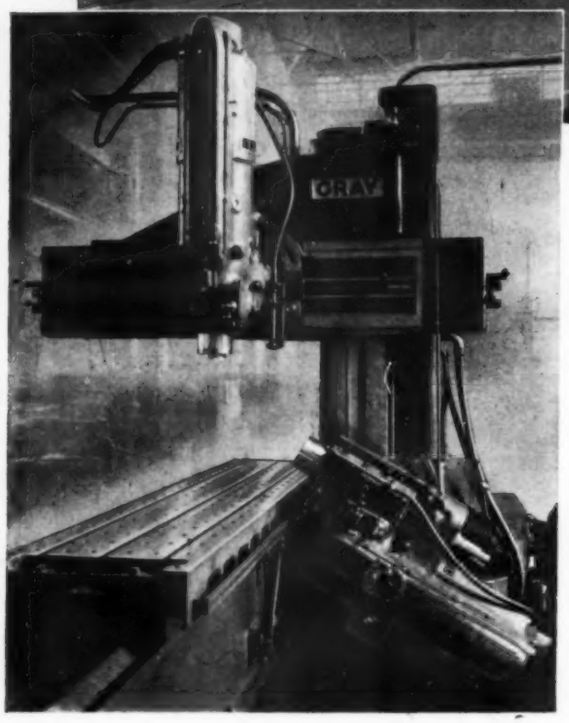
MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK





On the new

GRAY OPEN SIDE MILLING MACHINES

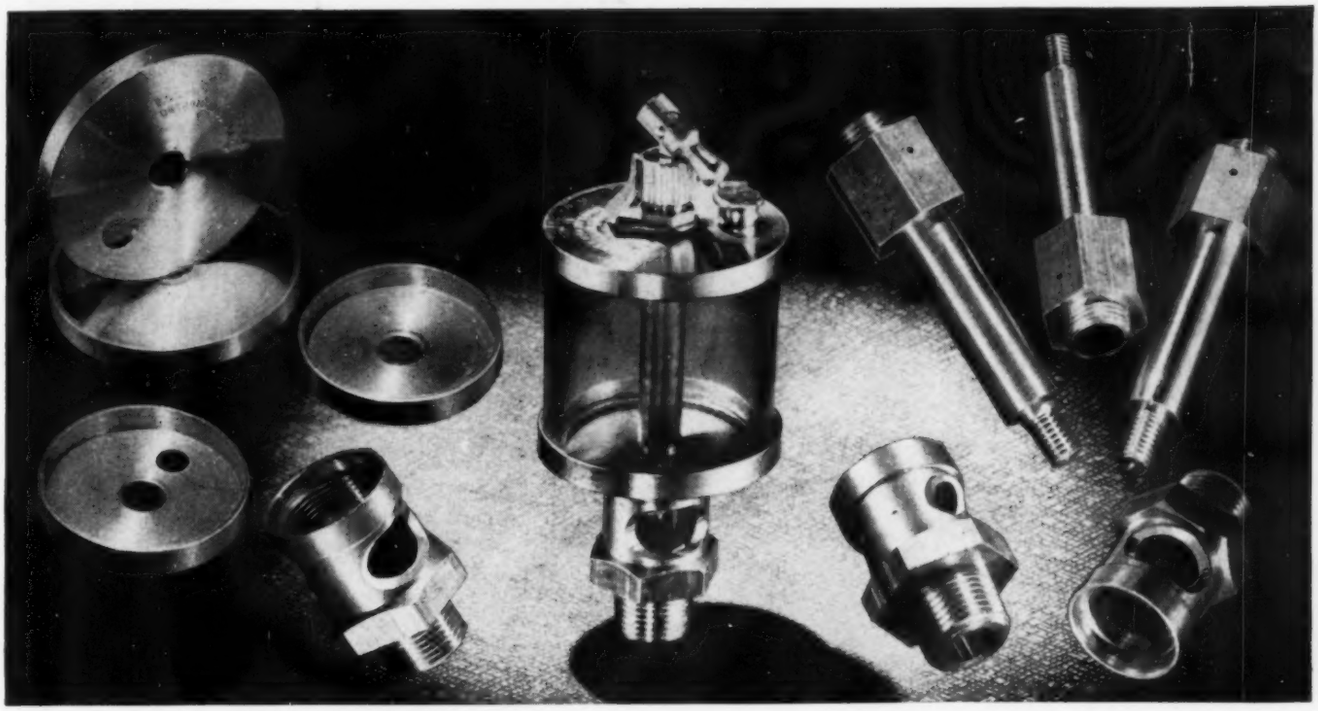
give **MAXIMUM FLEXIBILTY WITH HIGH PRODUCTIVITY AND ACCURACY**

The G.A. **GRAY** *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.
SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

You can machine it better, faster, for less...



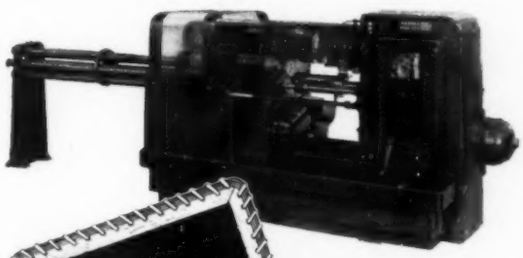
with a Warner & Swasey CAMLESS automatic

LUBRICATING DEVICES—such as the sight feed oiler above—are made by the Essex Brass Corporation of Detroit. They recently installed a Warner & Swasey 5-Spindle Camless Automatic to make possible a new manufacturing process. Here are the results:

BETTER—Various sizes of oil cup tops and bottoms (above top left) previously machined from castings are now produced from commercial brass rod. The greater strength of the new material makes a better product. Scrap loss has been cut more than 90%.

FASTER—The housing center posts (above top right) were formerly turned on a hand-operated machine. Production time, including setup, for 1000 pieces was 39 hours. Now that number is produced in 9 hours, including setup, for an hourly production gain of 300%.

FOR LESS—Setup time for each of the five different sizes of oil cup shanks (above lower right) runs from 1½ to 2 hours. Production time including setup is reduced 75%. The company reports additional substantial savings from greater accuracy and reduced hours of costly inspection.



FULL INFORMATION on these new machine tools will show you how their many design improvements give you finer precision, faster operation and greater economy. And rigid Warner & Swasey construction insures maintenance of these original qualities.

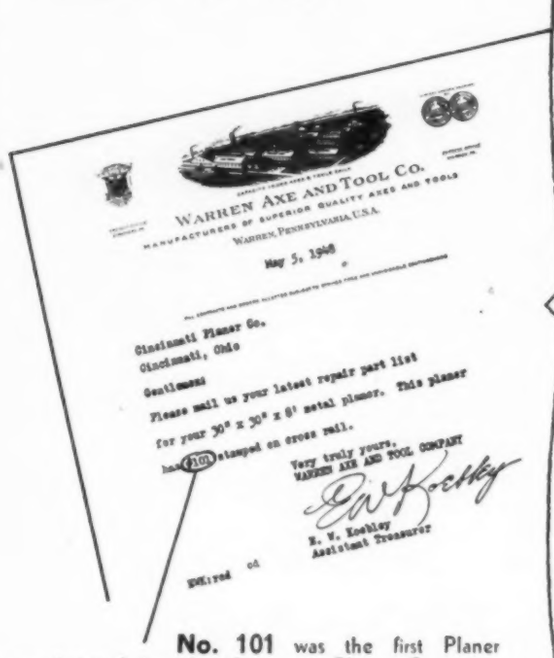
Available as 1¼"-5" and 2¼"-5" bar machines and 6" chuckers. Ask your nearest Warner & Swasey office or write—

It's simpler **to set up a Warner & Swasey CAMLESS Automatic!**

WARNER & SWASEY
Cleveland

Turret Lathes, Multiple & Single Spindle Automatics, Precision Tapping and Threading Machines

50 years



WARREN AXE AND TOOL CO.
MANUFACTURERS OF SUPERIOR QUALITY AXES AND TOOLS
WARREN, PENNSYLVANIA, U.S.A.

May 5, 1898

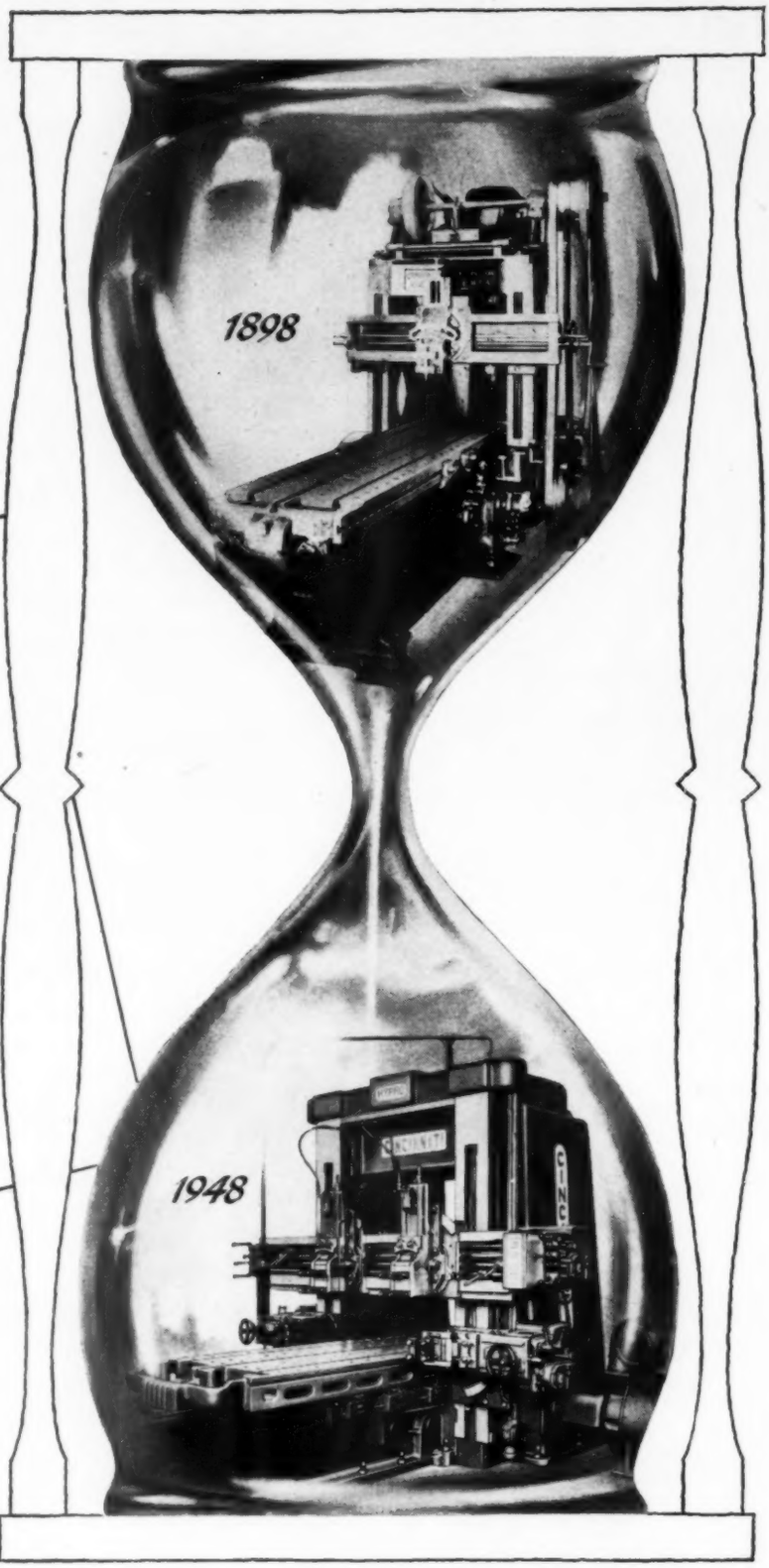
Cincinnati Planer Co.
Cincinnati, Ohio

Gentlemen:

Please mail us your latest repair part list for your 30" x 30" x 8' metal planer. This planer has #101 stamped on cross rail.

Very truly yours,
WARREN AXE AND TOOL COMPANY
E. V. Koehler
Assistant Treasurer

EVK:rsd cc



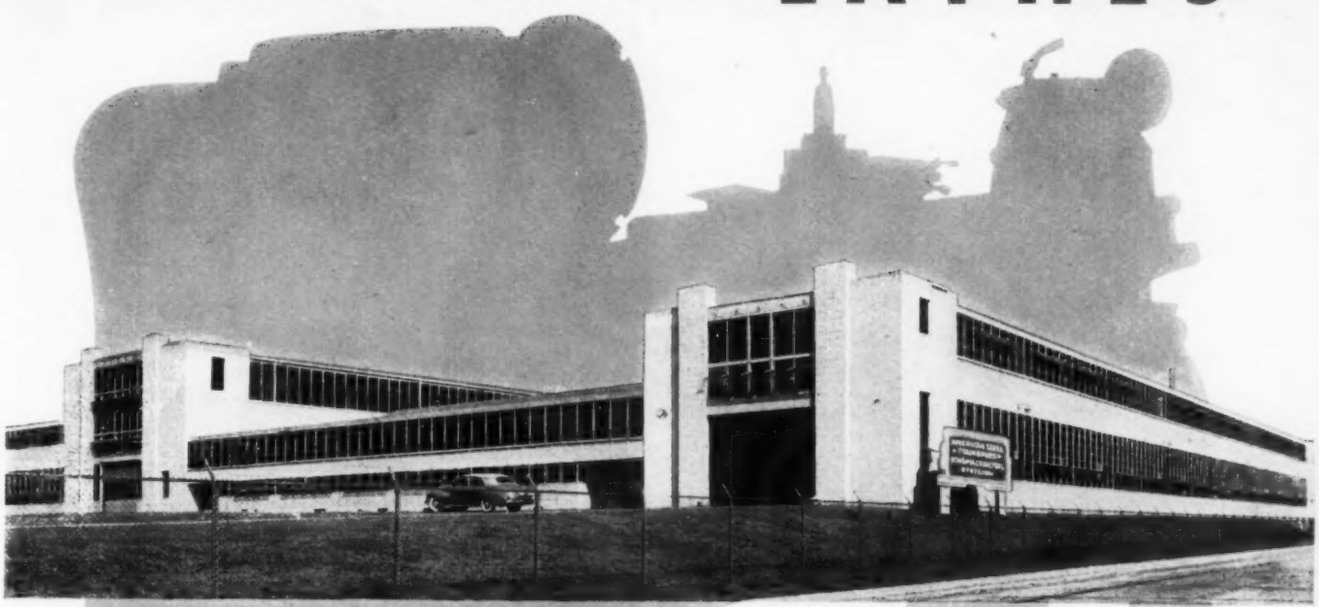
No. 101 was the first Planer manufactured by the Cincinnati Planer Company. They made a good Planer in 1898 of highest quality and finest workmanship which has stood the test of time.

Today we make an even better Planer. The modern Cincinnati HYPRO Planer, still retaining all of the Hypro-duction features and craftsmanship developed through years of experience, has been improved to incorporate new and exclusive features such as centralized finger-tip control for the complete operation of the machine, all steel hardened "twin" helical gear train, double nuts on both saddle and down slide screws, inverted dovetail slides, double acting tool block abutment, centralized dual saddle control and precision adjustment handles. These features provide increased production, lower planing costs and convenience to the operator.

Bulletin No. 138 will give you complete specifications. Write for it today.

THE CINCINNATI HYPRO PLANER COMPANY
PLANERS · BORING MILLS · PLANER TYPE MILLERS
CINCINNATI, OHIO

Sebastian GEARED HEAD LATHES



Now Manufactured By

BUILDERS OF
WORLD-RENOWNED "KING"
BORING & TURNING MACHINES

KING

For nearly three-quarters of a century, King . . . now a division of American Steel Foundries . . . has been recognized the world over as a manufacturer of finest precision machine tools. Throughout industry the name "KING" on a boring & turning machine is an accepted symbol of highest quality construction and performance. And now . . . in a new, ultra-modern plant . . . King devotes its unsurpassed engineering skill and production facilities to the manufacture of Sebastian Lathes. For a decidedly *finer* lathe, outstanding in the medium-price field, see your nearest Sebastian dealer. And write today for our illustrated Sebastian Lathe Bulletin.

American Steel Foundries

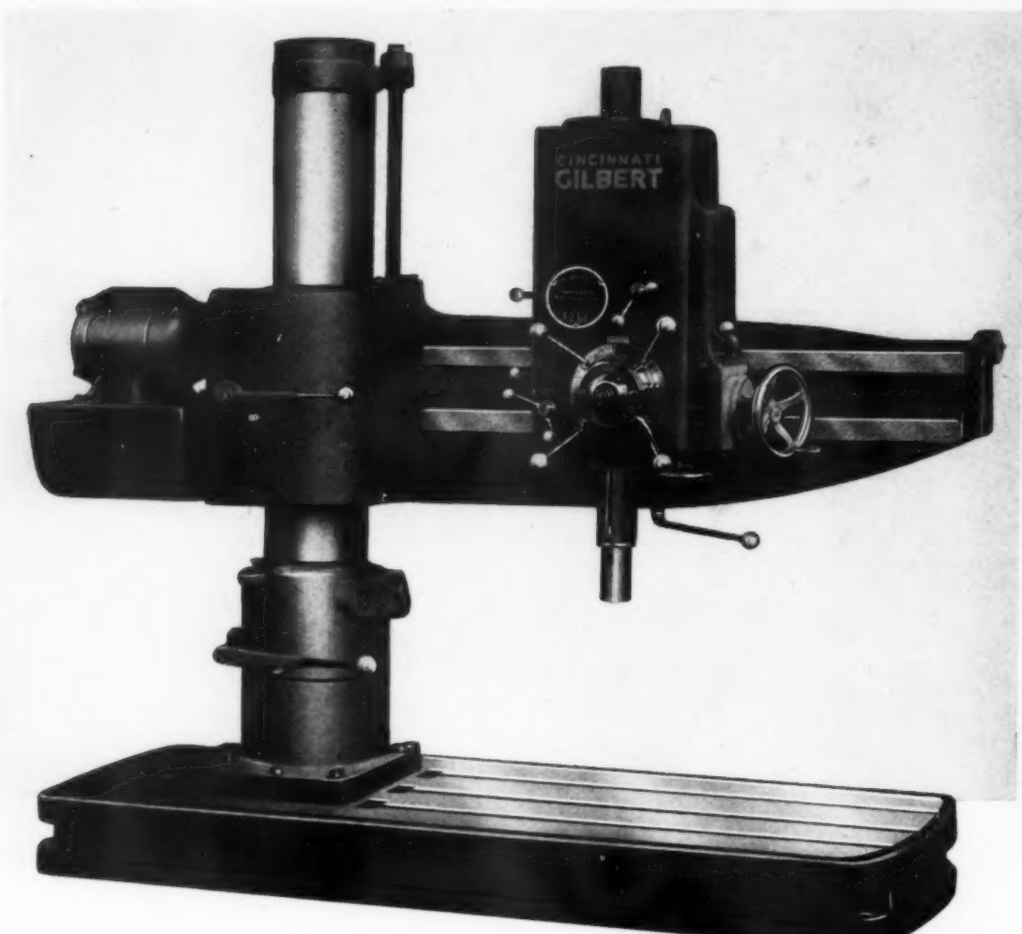
KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of Vertical Boring & Turning Machines and Sebastian Lathes

GILBERT *Presents*

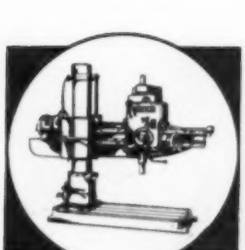
. . . A MODERN, PRACTICAL DEVELOPMENT IN RADIAL DESIGN



Check these features of the New 9- and 11-inch Column GILBERT Radial—and you'll see why it is a sturdier, more modern machine.

1. Heavy rigid construction throughout, with streamlined design for easy cleaning.
2. Centralized controls low on the head.
3. Direct reading feed and speed plates with feed and speed indicator.
4. Easy operating friction reverse—Instant release—No drag.
5. Improved head clamp—Definite clamp and unclamp positions.
6. Balanced head on arm for easy movement.
7. Full bearing support for spindle, even when fully extended.
8. Anti-friction bearings throughout.
9. Safety elevating nut—Safety elevating release —Works with arm raising or lowering.
10. Twelve spindle speeds and six power feeds.
11. Unit construction and interchangeability of parts for easy maintenance.
12. Electric wiring and controls enclosed in head and arm.

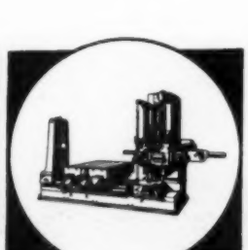
New Bulletin Available—Write for yours today.



THE CINCINNATI GILBERT MACHINE TOOL CO.

3360 BEEKMAN ST. • CINCINNATI 23, OHIO

RADIAL DRILLS . . . HORIZONTAL BORING MILLS



7,200 Pieces per hour

from 1 9/16" x .042" C.R.S. Coil Stock

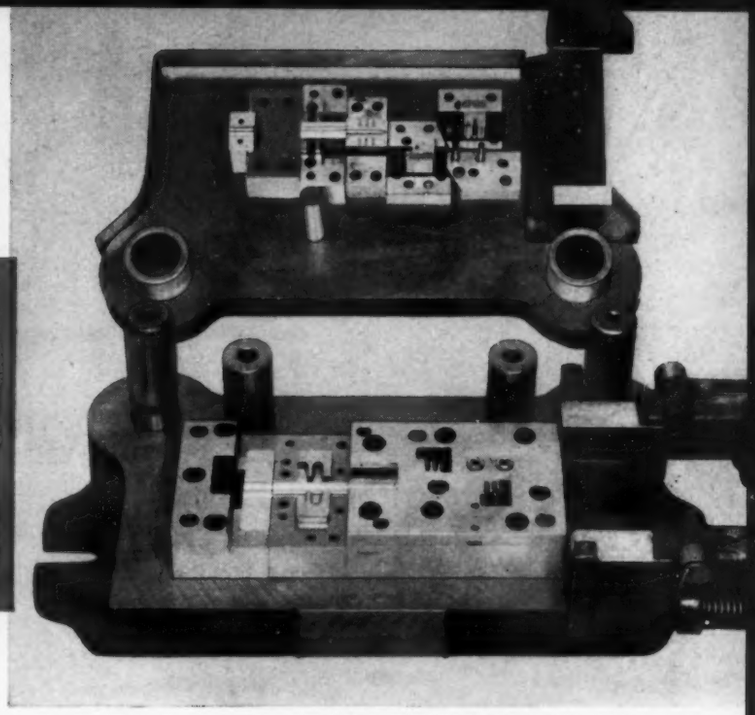


Photo courtesy of Federal Tool Corporation, Chicago

...using

DANLY *Precision* Die Set

Tolerance of .001" held on 10-station progressive die

save time USE DANLY NATION-WIDE DIE SET ASSEMBLY SERVICE

Assembly plants (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to your specifications.

- * **Chicago 50,** 2100 S. 52nd Ave.
- * **Cleveland 14,** 1550 E. 33rd St.
- * **Dayton 2,** 990 E. Monument Ave.
- * **Detroit 16,** 1549 Temple Ave.
- * **Grand Rapids,** 113 Michigan Ave., N.W.
- * **Long Island City 1,** 47-28 37th St.
- * **Los Angeles 54,** Ducommun Metals & Supply Co., 4890 S. Alameda
- • **Milwaukee 2,** 111 E. Wisconsin Ave.
- • **Philadelphia 44,** 18 W. Chelten Ave.
- * **Rochester 4,** 16 Commercial St.

Here's another example of how Danly Precision Die Sets maintain close tolerance punch and die relationship on high production work.

The part illustrated, a nut chopper cutter, is produced on a 10-station progressive die at a rate of 7,200 pieces per hour. An average of 100,000 pieces are obtained between grinds. Tolerance of .001" between stations is maintained.

To date the same original Danly Die Set has held the tolerance required for a total of 1,500,000 pieces, and under normal operating conditions, will continue to give many more hours of profitable service.

SEQUENCE OF OPERATIONS—The roll stock is fed automatically through the following sequence of operations: (1) Pierce and notch right edge, (2) pilot, (3) notch left edge, (4) rough form center, (5) finish form center, (6) idle, (7) twist, (8) idle, (9) idle, (10) cut off.

HELPFUL ENGINEERING SERVICE—For helpful engineering service on Die Sets of any size, standard or special, for any type of press operation, consult Danly without obligation.

write for this *Free* bulletin

Illustrates how you may use Danly's special machining and welding service to save additional time and money.

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT

Triple-action drawing and forming of new Hudson tops in Bliss Toggle Press. Blank is held by outer slide while inner slide forms roof and dwells. Rear window is formed by third action in press bed.

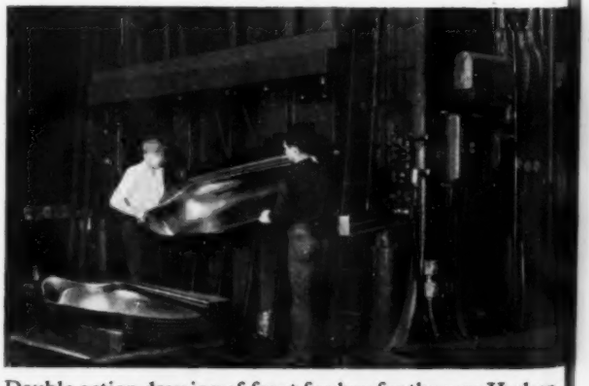
This time it's Hudson with 650 Bliss-Built Presses

From fender to top, just about every stamped part in a Hudson car is either blanked, formed, drawn or squeezed in one or more of the 650 Bliss-Built presses which total 97% of Hudson's entire press department.

"Bliss presses really stand-up under severe usage," says Hudson's master mechanic. "We've had them working 'around the clock' for several years during the war and since. Yet we've had little down-time due to press failure. They're simple to operate and maintain."

This overwhelming preference for Bliss equipment is duplicated in every pressed-metal-producing industry. It's because Bliss builds and delivers more than a press. Besides pioneering in press-construction improvements, Bliss provides a fund of engineering knowledge, going back over 90 years. "Bliss" on your press is more than a name—it's a guarantee. It will pay you to discuss your press problems with a Bliss press engineer.

Large and small end bosses on a forged connecting rod for a six-cylinder engine are compressed 3/64" in this 1200-ton Bliss-Toledo Knuckle Joint Press. Production averages 1133 per hour with an automatic chain-type feed.



Double action drawing of front fenders for the new Hudson also takes place in a Bliss-Toledo Toggle Press. Production averages about 180 per hour.

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France. SALES OFFICES AT: Detroit, Hastings, Mich.; New York, Rochester, N. Y.; Cleveland, Dayton, Toledo, Salem, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; New Haven, Conn.; Windsor, Ont.

MARQUETTE · BLISS · CONSOLIDATED · TOLEDO ·

BLISS BUILT

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD

the Cone Reporter makes note that—

Conomatic Progress Reporter

Buffalo Niagara Electric Corp. will soon have the most powerful transformer ever built in this country. It steps up from 13,200 volts to 115,000 volts and can handle 150,000 horsepower.

Progress with Conomatics

A ten-pound plastic molding recently made by General Electric Plastic Div. is said to be the largest ever produced.

Conomatics for *Progress*

Linde Air Products Co. is now supplying liquid nitrogen capable of reducing temperature to –320°F.

Progress with Conomatics

Patent 2,441,594 has been granted for a method of separating iron from low grade ore. The iron patches are magnetized and then separated from the crushed ore by being pulled over a magnet.

Conomatics for *Progress*

A fully equipped Diesel research laboratory has been opened at Oklahoma Agricultural and Mechanical College.

A new Conomatic bar machine now provides simple dial control for change of working stroke travel of all slides. The machine retains all the advantages of Cone's exclusive, powerful, cam drive.

Progress with Conomatics

The new GE electric meter uses magnetic suspension for the rotor shaft instead of bearings.

Conomatics for *Progress*

The factory manager at Bata Works, Czechoslovakia, has an office that moves up and down in the building like an elevator.

Progress with Conomatics

Foote Mineral Co. of Philadelphia has begun the commercial production of zirconium.

Conomatics for *Progress*

Eaton Mfg. Co. has developed an automatic electric shift for its two-speed truck axles.

Kaiser-Frazer Corp. is preparing to make automobile doors of die-cast aluminum.

Progress with Conomatics

Battelle Memorial Institute has succeeded in welding aluminum slabs up to two inches thick.

Conomatics for *Progress*

Since hydraulic equipment is sometimes needed where electricity is not available, Hydro-Power, Inc., of Springfield, Ohio, is making a power unit driven by a gasoline engine.

Progress with Conomatics

Reeves Instrument Corp. is making an electronic computor capable of solving differential equations that is small enough to go in the average engineer's office.

Conomatics for *Progress*

Insulation can easily be stripped from wire by dipping it in a liquid made by Aircraft Marine Products, Inc., of Harrisburg, Pa.

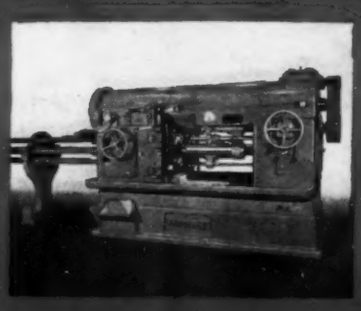
Progress with Conomatics

Libbey-Owens-Ford Glass Co. is making sound and heat insulating partitions of sealed double glass.

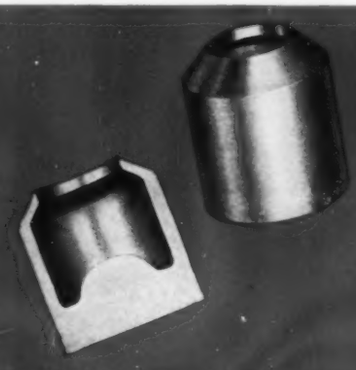
Conomatics for *Progress*

According to the Pittsburgh Bureau of Smoke Prevention the city has had 50% less smoke and 39% more sunshine during the last year.

ADAPTABILITY
and DEPENDABLE PERFORMANCE
Conomatics give BOTH



The sample shown illustrates a combination of ingenuity of method plus the facility of a good automatic to effect an 18-cent production saving per piece.

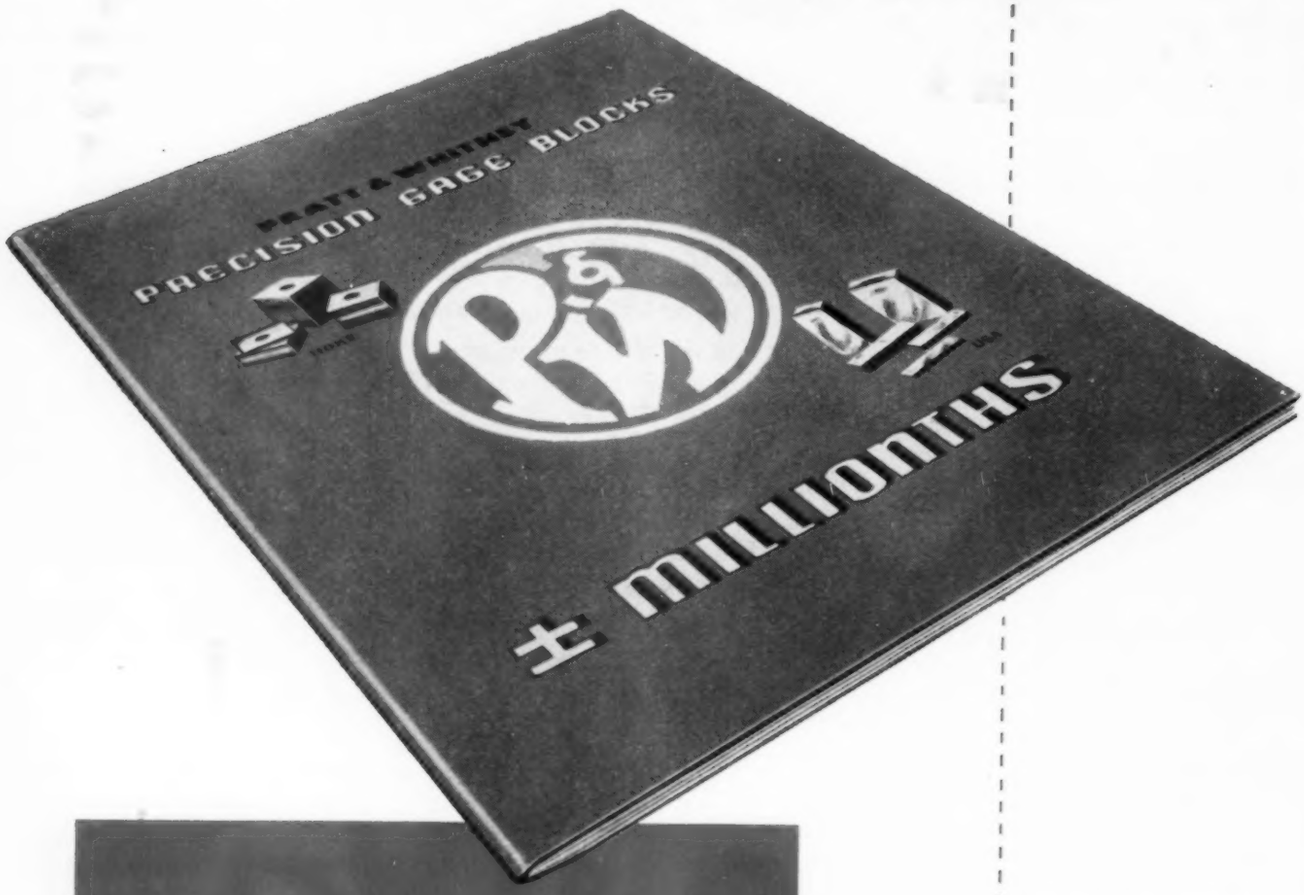


Cross section showing interior

CONE AUTOMATIC MACHINE CO., INC.
WINDSOR, VERMONT, U.S.A.
53

To every man responsible for precision measuring:

You ought to have your own copy of this new booklet!



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HOKE USA

Precision Gage Blocks

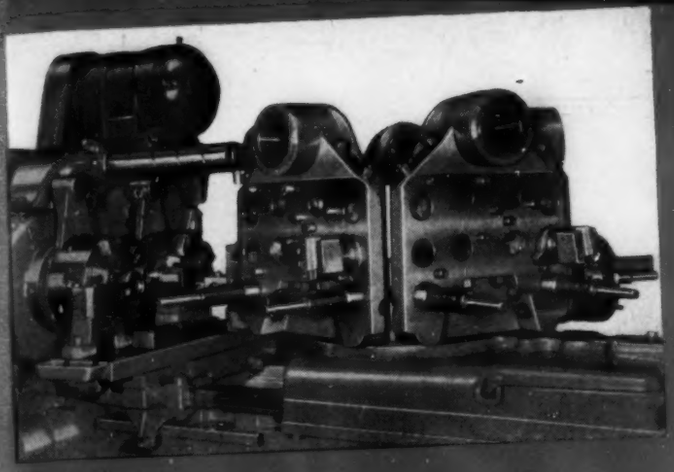
Accuracy's Greatest Common Denominator

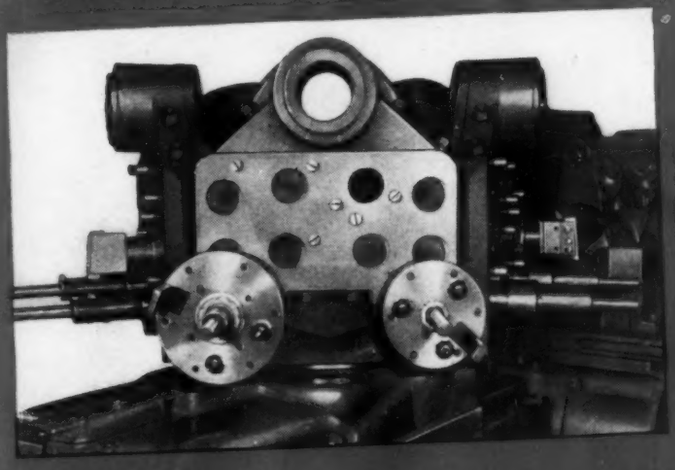
"The basic standard of Precision Measurement"

*Just off the press

This newly-revised, up-to-date book tells all there is to tell about "Accuracy's Greatest Common Denominator"—P&W Hoke and USA Precision Gage Blocks. Invaluable to any man responsible for precision measuring. Sent only on request. Write for your copy of "Plus or Minus Millionths".

PRATT & WHITNEY
***Division* Niles-Bement-Pond Co.**
West Hartford 1, Connecticut





DETAILS OF JOB...

Part: Bearing Case

Material: Cast Iron

Method and Operation (Front Spindle): Presenting flange to spindle, grip with 3 chuck jaws.

Machine as follows:

1st T.F.: Rough bore 2.436" dia.; rough bore 2.716" dia.; rough turn 3.936" dia.; rough face flange; rough face end.

2nd T.F.: Finish bore 2.436" dia.; finish bore 2.716" dia.; finish turn 3.936" dia.; finish face flange; finish face end.

3rd T.F.: Chamber holes (Slide Tool).

4th T.F.: Ream 2.436" dia. hole; ream 2.716" dia. hole; size turn 3.963" dia.

5th T.F.: Drill 3-7/16" dia. holes in flange.

Part: Bearing Carrier

Material: Cast Iron

Method and Operation (Rear Spindle): Presenting outside toward spindle, grip with 3 chuck jaws.

Machine as follows:

1st T.F.: Rough bore hole; rough face flange bosses.

2nd T.F.: Finish bore hole; finish face flange bosses; chamfer.

3rd T.F.: Form internal recesses; chamfer (Slide Tool).

4th T.F.: Ream 2.836" dia. hole.

5th T.F.: Drill 2-17/32" holes in flange.

Two somewhat similar pieces machined simultaneously in 2.42 minutes total time on a

P & J 5D2-12" POWER-FLEX AUTOMATIC TURRET LATHE

The bearing carrier and bearing case machined on this P&J 5D2 Automatic Turret Lathe are of such similar design and size that P&J Methods Engineers were able to tool up to take advantage of the greatly increased output from two spindles operating simultaneously.

The total average floor-to-floor time for the two pieces, including allowance for chucking is 2.42 minutes. The cycles of operation are such as to attain the same output (19.4 pieces per hour) per spindle or a total of 38.8 pieces per hour from each machine unit.

The P&J 5D 2-spindle machine provides many opportunities to achieve much higher production rates than from single spindle units. A careful study of your machining requirements of duplicate parts by P&J Methods Engineers may well point the way to greater economy and higher production. You are invited to avail yourself of P&J experience on any chucking work.

POTTER & JOHNSTON CO.
Pawtucket, R. I.

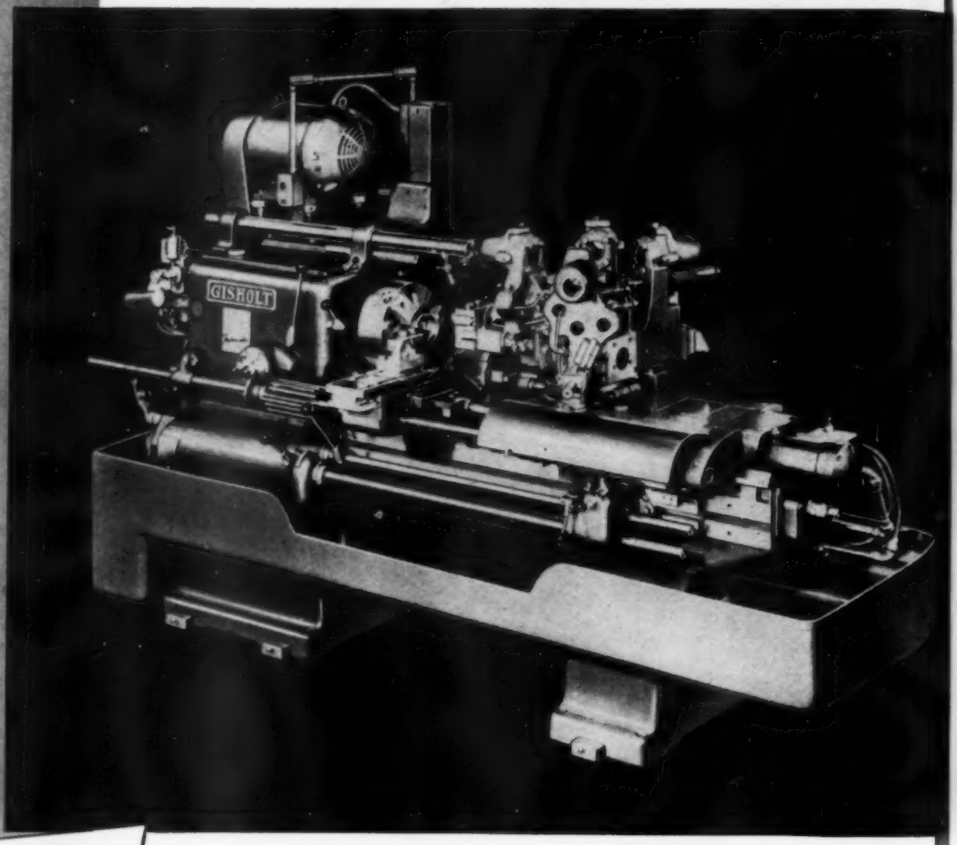
Subsidiary of
PRATT & WHITNEY
division Niles-Bement-Pond Company

Pioneer Manufacturer of Automatic Turret Lathes

GISHOLT

FASTERMATICS

AUTOMATIC TURRET LATHES



FASTER operating cycle

FASTER speed changes

FASTER feed changes

FASTER job set-ups

FASTER production

If you have work calling for a maximum number of surfaces to be machined in one chucking — investigate the Fastermatic. Six turret faces and two independent cross-slides provide a degree of flexibility not found in any other type of standard machine of comparable size. Completely automatic operation gives you the speed to cut costs on a wide range of jobs. Write for the Fastermatic catalog.

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

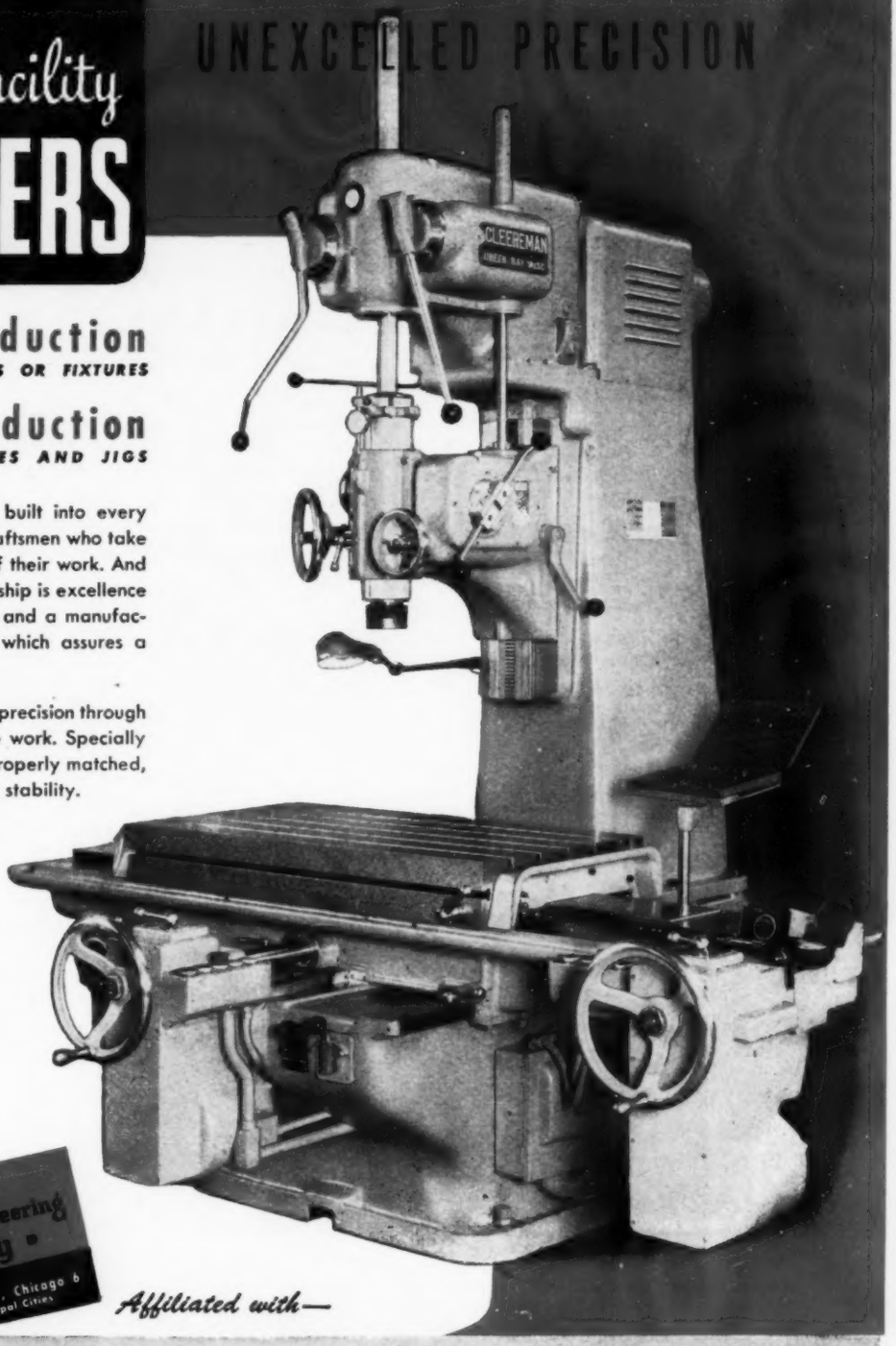
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

CLEEREMAN

UNEXCELLED PRECISION

PRECISION with STAMINA and *Operating Facility*

JIG BORERS



Small Lot Production
WITHOUT LAYOUT TIME, JIGS OR FIXTURES

Tool Room Production
OF ACCURATE TOOLS, DIES AND JIGS

UNEXCELLED PRECISION is built into every Cleereman Jig Borer by skilled craftsmen who take a personal pride in the quality of their work. And behind their exceptional workmanship is excellence of design, exacting specifications and a manufacturing technique and procedure which assures a precise machine tool.

STAMINA maintains this in-built precision through a long life of extremely accurate work. Specially processed and tested materials, properly matched, combat wear of ways and secure stability.

OPERATING FACILITY has long been accepted as characteristic of all Cleereman machine tools. Convenient, time saving grouping of controls aids appreciably in producing more work. Prepositioning power rapid traverse or electronic traverse and milling control accessories speed operation.

WIRE OR WRITE for catalog with complete specifications.

Address —

1908 - 1948 40th Anniversary CLEEREMAN MACHINE TOOL CO.

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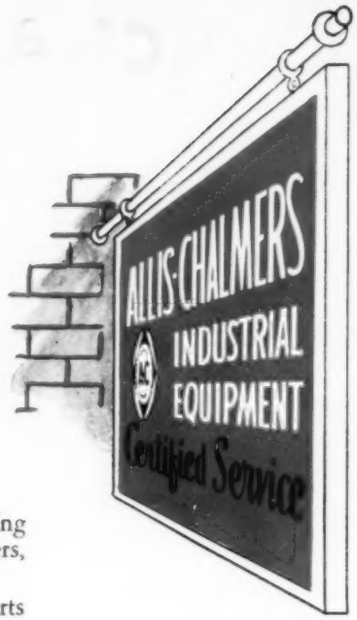
BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

"Certified" Service

AN ADDED REASON FOR INVESTING IN ALLIS-CHALMERS MOTORS!



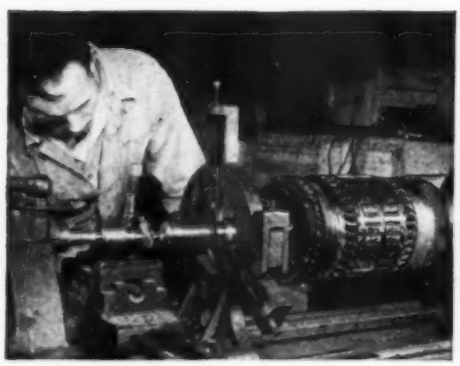
IT MEANS: 1) *Better, Faster Service.* Independent local repair shops are now being selected and authorized to service and repair Allis-Chalmers Motors, Transformers, Controls, Pumps — and "Certify" them as to workmanship.

2) *Finest Parts and Workmanship.* Shops use genuine Allis-Chalmers repair parts — or parts of equal quality; and are given complete service information, including factory procedure and drawings where necessary.

3) *Friendly Service.* Every Allis-Chalmers "Certified" Service Shop has been selected on the basis of its reputation in its community. It's the kind of company you *like* to do business with!

How can you get this service? For the present most "Certified" Service Shops are located in the larger U. S. industrial areas . . . but they're expanding rapidly. Call your nearby A-C District Office or Authorized Dealer for closest recommended shop. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

FINER, FASTER, FRIENDLIER SERVICE FOR INDUSTRY!



The A-C Supply Company of Cuyahoga Falls, Authorized Allis-Chalmers Dealer and newly-appointed "Certified" Service Shop, is staffed and equipped to give prompt, efficient, top-quality repair and service aid to customers in the greater Akron industrial area. Typical of the kind of "Certified" Service organizations being selected throughout U.S.

MANY SIZES, RATINGS OF ALLIS-CHALMERS STANDARD SQUIRREL-CAGE MOTORS ARE NOW AVAILABLE FROM STOCK. CHECK YOUR AUTHORIZED A-C DEALER, OR DISTRICT OFFICE FOR DETAILS.

A 2506

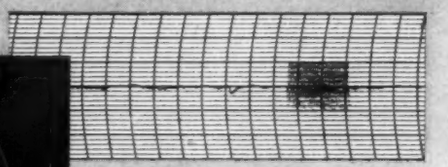
ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

PUT IT ON THE BLANCHARD

MAKE BETTER, LONGER-LASTING PARTS WITH FINER, FLATTER SURFACES

—Eliminate Lapping!



SURFACE FINISH CHART OF BLANCHARD-GROUND PIECE, USING BRUSH SURFACE ANALYZER WITH ATTENUATOR SET AT .01. SURFACE HAS ROUGHNESS VALUE OF ONLY 2 MICRO-INCHES.

3″ Valve Plate for Hydraulic Pump. Hardened Steel.

Checking flatness of Blanchard-ground surface with optical flat. Parallel lines show surface is flat within ½ light band. (5.8 millionths of an inch.)

Cast Iron End Plate for Refrigerator Compressor.

The optical flat shows this Blanchard-ground surface flat within ½ a light band.

Checking flatness of production-lapped piece received from customer. Note the variation from flatness as shown by the curved lines.

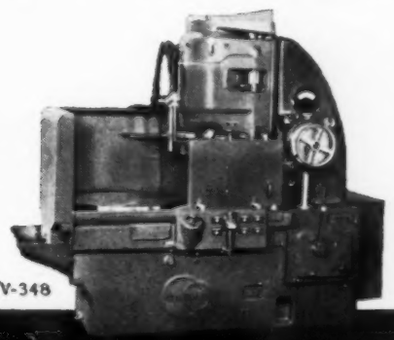
As you know, the operation of lapping charges the worked-upon surfaces with lapping grit. The presence of this lapping grit — which is practically impossible to remove — lowers the ability of the lapped surfaces to resist wear.

Blanchard research has perfected a method of flat surface grinding — using only their standard Blanchard Grinders — whereby extremely fine finishes *and* extreme flatness can now be produced in *quantity production*. The illustrations show what is being accomplished. Lapping and all other subsequent finishing operations are eliminated.

Such Blanchard-ground parts show useful life increase of up to 5 times that possible with lapped parts. Joints are tighter and withstand pressures as high as 3,000 lbs. oil per sq. in. without leaking.

If you have critical flat surfaces that require extremely fine finishes, close sizing and extreme flatness — and would like to produce them in the best and least expensive manner — it will pay you to get the advice of Blanchard engineers.

Simply send us the data, with samples if available and practical. This Blanchard Service is of course free and does not obligate you.



V-348

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

ACCURACY the EASY WAY...

with the Van Keuren GEAR MEASURING SYSTEM

Spurs, Helicals, Splines, Serrations

The Van Keuren Gear Measuring System is generally accepted as the easiest and most accurate method of checking tooth thickness of gears, 30° involute splines and 90° involute serrations. A measurement is made over two opposing wires and this actual measurement is compared with the theoretical measurement over wires for a perfect gear as computed from the Van Keuren tables for 1 diametral pitch gears.

The only equipment required is a set of 2 wires of the proper size for each diametral pitch.

Standard sizes of wires available from stock are:—

- 1.728"/DP — for external spurs and helicals
- 1.44"/DP — for internal spurs and splines
- 1.92"/DP — for enlarged pinions, 30° involute splines and 90° involute serrations.
- 1.68"/DP — Alternate series for special requirements.

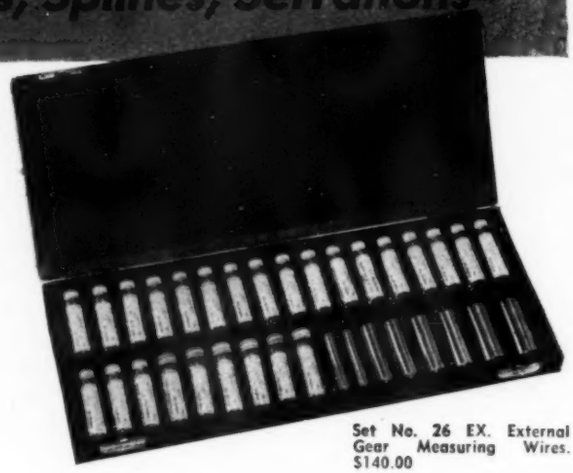
SIMPLE . . . For spur gears, involute splines and serrations, the only calculation is one of simple division. For helical gears use the simplified computation forms VK-103, VK-104 or VK-105.

RELIABLE . . . The 1.728"/DP System is used by over 90% of American gear producers and users. The 1.44"/DP and 1.92"/DP systems have been incorporated in standards for involute splines and serrations.

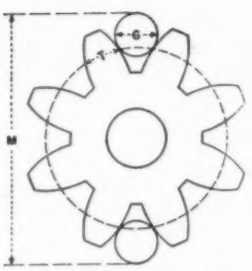
ACCURATE The Van Keuren Gear Tables are complete for gears from 5 to 500 teeth and for pressure angles of 14½°, 17½°, 20°, 25° and 30°. If the measurement over the wires is greater than the value calculated from the tables, the tooth is too thick and the cutter must be fed further into the gear blank. Constants for controlling tooth thickness and backlash to .0001" are given for all pressure angles.

The New 1948 VK Catalog and Handbook No. 34, is a 208 page manual indispensable for engineers, designers, inspectors, toolmakers and machinists. It contains simplified formulas and accurate tables for measuring spur gears, helical gears, splines and worms. New and epoch making formulas and tables are presented for the first time for the exact measurement of 29, 40 and 60 single and multiple start screw threads and worms.
It includes a complete resume of American & European screw thread systems, new methods of measuring included angle of screw threads, a new method of inspecting flat ring seal surfaces with light waves, and other valuable information. Price $1.00 each postpaid.

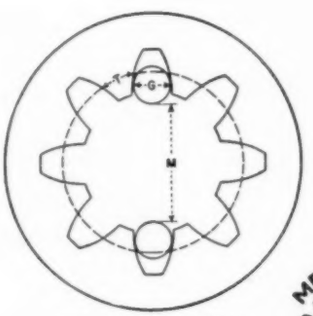
Write for your copy



Set No. 26 EX. External Gear Measuring Wires. $140.00



EXTERNAL SPUR GEAR



INTERNAL SPUR GEAR

MEMBER OF AGMA

THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

29th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

WHEN YOU WANT *More* TOOL LIFE

TRY BARBER-COLMAN CARBIDE TIPPED MILLING CUTTERS

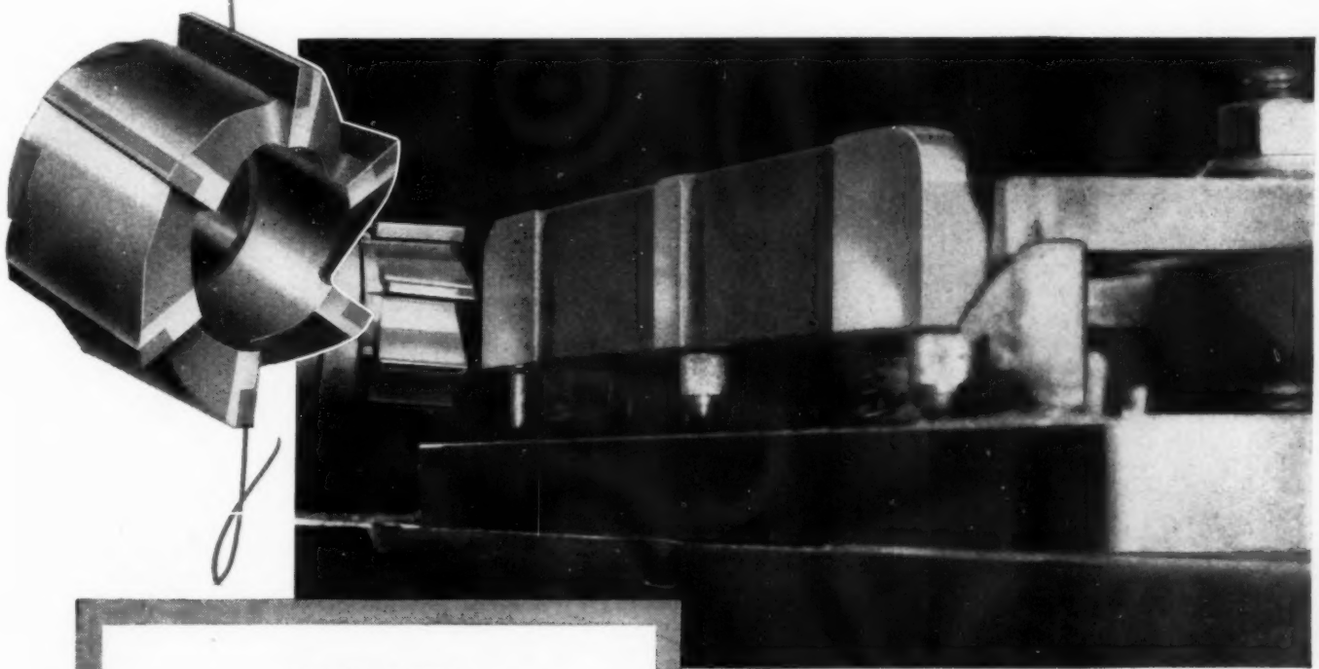
This job was slow and costly because of low tool life and high cutter breakage. Three intermittent bosses on cast-iron brackets required the removal of ¼" stock. Hard spots and abrasive action of the material combined to shorten tool life by nicking and chipping the cutting edges.

After careful analysis of all factors, Barber-Colman Cutter Engineers recommended the use of carbide tipped shell end mills, with fewer teeth and slight-spiral gashes. Today, experience-tested B-C tip mountings and heat-treated high speed steel bodies are successfully withstanding the shock of the hard spots, and tool life and production are increased approximately 400%.

If your job conditions are suited to the use of carbides, consult a Barber-Colman representative on your next production problem. Experience the satisfaction that this manufacturer had in improving operation and increasing production.

Barber-Colman Company

GENERAL OFFICES AND PLANT 114 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.



JOB FACTS

Operation — Face mill 3 bosses removing ¼" stock, center boss 2" x 1", end bosses 2" x 2½".

Material — Medium cast-iron.

Cutters — B-C Carbide Tipped Shell End Mills, 2⅛" x 1½" x 1¼", slight spiral gashes.

	HSS Cutter	C-T Cutter
Feed	3"-4" per min.	15" per min.
Speed	40 S.F.M.	240 S.F.M.
Floor-to-floor	30-40 in 10 hrs.	90 in 10 hrs.
Tool Life	50 pcs. per sharpening.	200 pcs. per sharpening.

BARBER COLMAN

MODERN MACHINES DEMAND *Modern* CUTTING TOOLS

EASIER HANDLING SAVES YOU MONEY

...AND THE LOW COST WILL SURPRISE YOU!

A 100-pound *heavy metal* casting calls for a hoist . . . but its Alcoa Aluminum counterpart is a hand-lifting job through every step of production. That saves plenty in man-hours and productivity . . . and *tempers*.

The smooth, solid, as-cast surface of Alcoa Aluminum Castings requires little or no finish machining. Where machining is needed, you can run tools faster.

Paint aluminum castings or not, as you prefer. Aluminum never shows red rust, is highly resistant to corrosion by most industrial atmospheres and chemical products.

The cost of Alcoa Aluminum Castings is lower than you'd expect. For many types of finished parts, aluminum competes with heavy metals. Get the whole story and prompt quotations from the nearby Alcoa Sales Office. Or write ALUMINUM COMPANY OF AMERICA, 2107 Gulf Bldg., Pittsburgh 19, Pa.

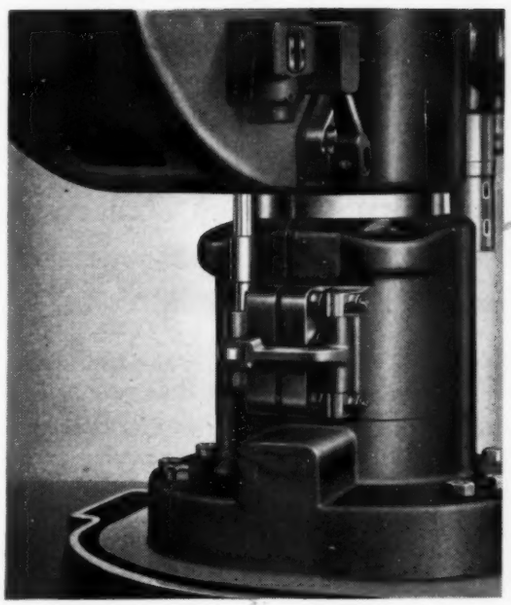
ALCOA FOUNDRIES AT BRIDGEPORT, CLEVELAND, DETROIT, LOS ANGELES

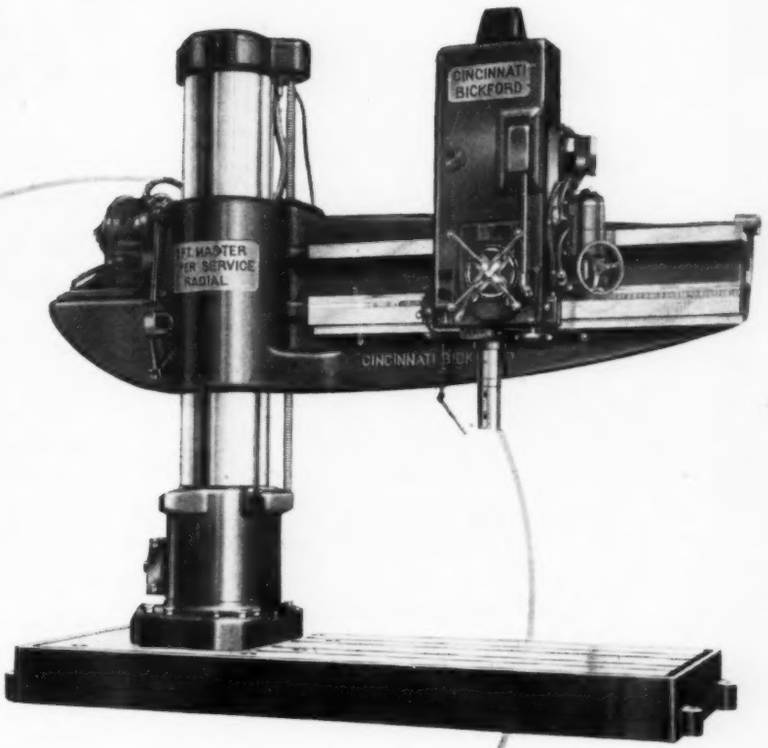
ALUMINUM CASTINGS *by* ALCOA

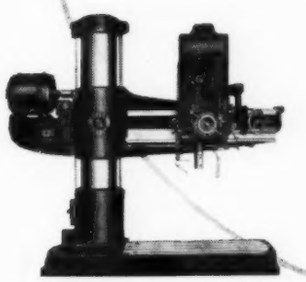
ALCOA

New Things—

that are an OLD STORY...







The Super Service hydraulic arm and column clamping—push button controlled from the head—is dependable, rigid, and is a factor in the outstanding accuracy of Cincinnati Bickford Super Service Radial Drills.

Behind this feature are many years of development, plus ten years of use in the field—Bickford engineering is both precise and up to date.

Now Bickford hydraulic arm and column clamping is standard—starting with 11" diameter column, and up through the large 26" diameter column machines.

The great range of speeds and feeds, and step-saving controls centralized on the Super Service "clear view" head, increase production.

Long life and low maintenance are well-known features of Cincinnati Bickford Super Service Radial Drills.

They are profitable, accurate and productive.

Write for Bulletin No. R-29, covering the 11" to 19" diameter column—and Bulletin R-22 on the 22" to 26" diameter column.

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE
Radials 7½" dia. col., 2½' arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

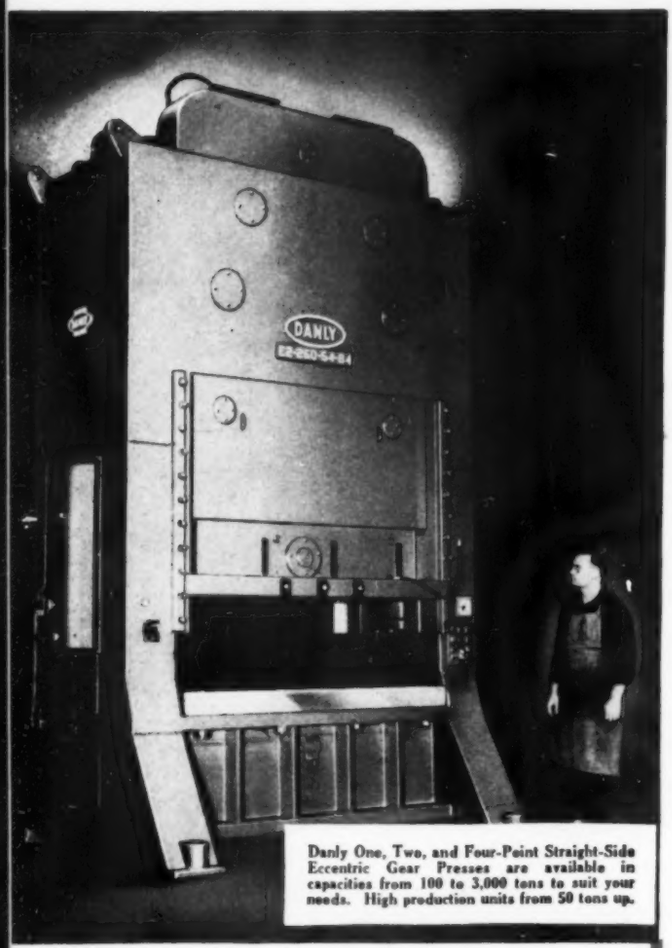
Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

How the Pitman Wrist-Pin Design Promotes Longer Press Life on

DANLY Presses

View showing pitman wrist-pin and replaceable bronze bushing, connection and slide adjustment. Long, accurate guide eliminates bending stresses in adjusting screw.



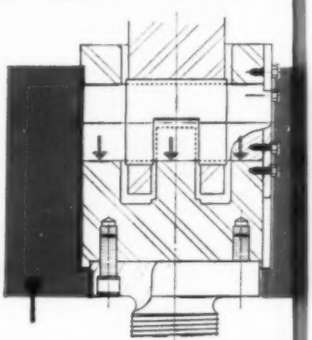
Danly One, Two, and Four-Point Straight-Side Eccentric Gear Presses are available in capacities from 100 to 3,000 tons to suit your needs. High production units from 50 tons up.

SIMPLIFIED CONSTRUCTION PERMITS ACCURATE MACHINING OF PITMAN AND SLIDE PARTS—ASSURES LONGER PRESS LIFE, LESS DOWN-TIME

Here is more proof of the care taken in designing Danly Presses to assure longer press life, less down-time.

The application of the pitman wrist-pin and the construction of the slide adjusting mechanism permits accurate machining and precision fitting of the component parts.

As illustrated, three-point support for the power stroke eliminates possibility of wrist-pin shearing, and minimizes deflection. The wrist-pin is locked in the guide of the slide adjusting unit to prevent oscillation. Wear on the pin and pitman is minimized by use of a *hardened and ground* pin, and aluminum-iron alloy bronze bushings with special properties for toughness and resistance to wear. The moving parts of the connecting assembly are lubricated by the main built-in circulating filtered oiling system.



Wrist-pin hardened and ground to precision tolerances is accurately fitted and locked in machined guide. Replaceable wrist-pin bushing of tough wear-resistant bronze alloy reduces maintenance. Three-point bearing support on power stroke prevents pin shearing, minimizes deflection.

This careful engineering of Danly Presses, the result of 25 years of association with the metal stamping industry, promotes longer press life, longer die life, higher production efficiency, and lower net costs.

Check These DANLY *Press Features*

- ☐ New Exclusive Ventilated Air Friction Clutch—gives long trouble-free service—cuts maintenance costs.
- ☐ Built-in Automatic Filtered Oiling System lubricates all bearings — including flywheel bearings.
- ☐ Rigid Box-Type Frame Construction of Stress-Relieved Welded Steel Plate.
- ☐ Fully Enclosed Crown Construction.
- ☐ Extra Long Bronze Lined Slide Ways and Precision Machined Gibs.
- ☐ Safe Automatic Electrical Controls with Reverse and Anti-Repeat Feature.

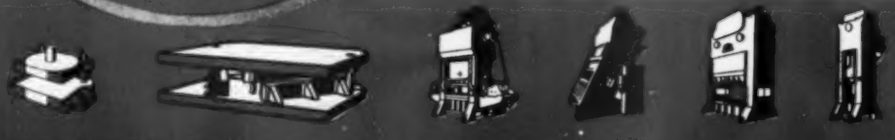
write for *Free* bulletin

Write today for more facts about Danly Presses. Get details on other important cost-saving features, especially engineered to help you reduce down-time and increase production. Ask for specific recommendations or engineering assistance.

DANLY

DANLY MACHINE SPECIALTIES, INC.

2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS



25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT

SPOT NEWS OF METALWORKING

Metalworking production rate rose four points in July, according to the American Machinist Index. July stood at 220, compared with 216 in June (1939-100). The gain is traceable mostly to a sharp spurt in the automobile industry. The "auto and trucks." component for July was 229, up 11 points from the previous month.

Fear of losing labor is forcing many small shops to buy steel in the gray market. These shops figure that a temporary loss in profits is better than losing men during a critical shortage of skilled and semi-skilled labor.

Russia is reported unwilling to place orders for British metalworking products, including machine tools, because the British asking prices are 40 to 50 percent above world levels and delivery dates are 10 to 15 months beyond stipulations in the British-Soviet trade treaty.

One Detroit steel broker is canvassing by automobile trailer every shop in town for available sheet steel. He secured 27 tons the first week from small shops which had overordered.

Coating of steel gear wheels with bronze by a casting process was developed in the German non-ferrous foundry industry during the war. Shortage of tin led to the development. Though the process increased costs, bronze-lined gears have high strength.

Marshall Plan orders will take 20 percent of one Cleveland company's output of truck parts this year, including timing chains, gears and axles. Initial orders came from Holland and Norway.

British export shipments of motor cars topped U. S. shipments in June, with total of 20,241 passenger cars and taxis and 6590 commercial vehicles. The six-months' total is 115,580 cars and 34,070 trucks.

Imports of limited quantities of tin-bearing alloys will be permitted by Commerce Department under conditions designed to hold such imports to a minimum. This action will reduce pig-tin allocations made to U. S. by International Combined Tin Committee.

Importation of engineering designs into United Kingdom will require separate licenses from now on, where payment is involved.

Republic Steel has doubled its output of stainless steel with the opening of the new Enduro No. 2 plant at Massillon, Ohio.

Some of the most modern and useful machine tools installed in New Zealand plants were recently landed from Germany. This first reparation shipment covers a wide variety of machines which were built between 1934 and 1944.

Russia has a new giant all-welded pig iron carrier mixer of 200 tons capacity in production in the Ural Machine Building Works for a modern Soviet steel mill.

Gaging Metalworking

Shipments of finished steel during the first half of this year indicate, if production continues at the present rate for the rest of the year, that the 1944 wartime record will be shattered by 1,250,000 tons. Shipments of sheet and pipe were chiefly responsible for the substantial gain in total shipments over the first half of 1947.

Steel users have been subjected to a series of price increases: (1) change from basing point to fob mill (2) steel companies' direct increases in prices (3) boost in freight rates. One company estimates that its steel costs for 1948 will be raised more than $8 million by these three things.

Even with price increases and expanded steel production, a dark picture is staring consumers in the face as far as strip and sheet is concerned for the last quarter of 1948 and all of 1949.

Aluminum Supply Critical

The situation in aluminum is steadily getting worse and there is little hope held for an adequate supply for some time. With a potential demand for around 3 billion pounds and a predicted production rate of only 1.6 billion pounds, a future shortage is certain. It is estimated that the demand will increase 15% and that production at the most will rise only 20%. Therefore only 5% of the tremendous backlog will be reduced.

Higher Copper Price Firm

All doubt for the present has been removed on the price situation in copper. Kennecott finally fell in line by increasing its price to 23½ cents a pound after holding out more than a week after other producers had pushed the price up to this figure.

Fabricated copper and copper alloys were first increased by a wage adjustment, then by the increase in the price of tin, and then by this latest jump in copper itself. Demand for all copper continued active despite the price increase.

Increased prices are firm and demand strong in other non-ferrous markets.

Tool, Die Business Up

In the tool and die field during June there was a small gain in orders and a 4% rise in sales invoiced, with a subsequent decline in backlogs of 4%. For the first six months of 1948, sales invoiced followed very closely the pattern set in the first half of 1947. For the first time since last November more than half the companies report the outlook as excellent or good. This continues a change in trend which started in May.

Foundry Equipment Sought

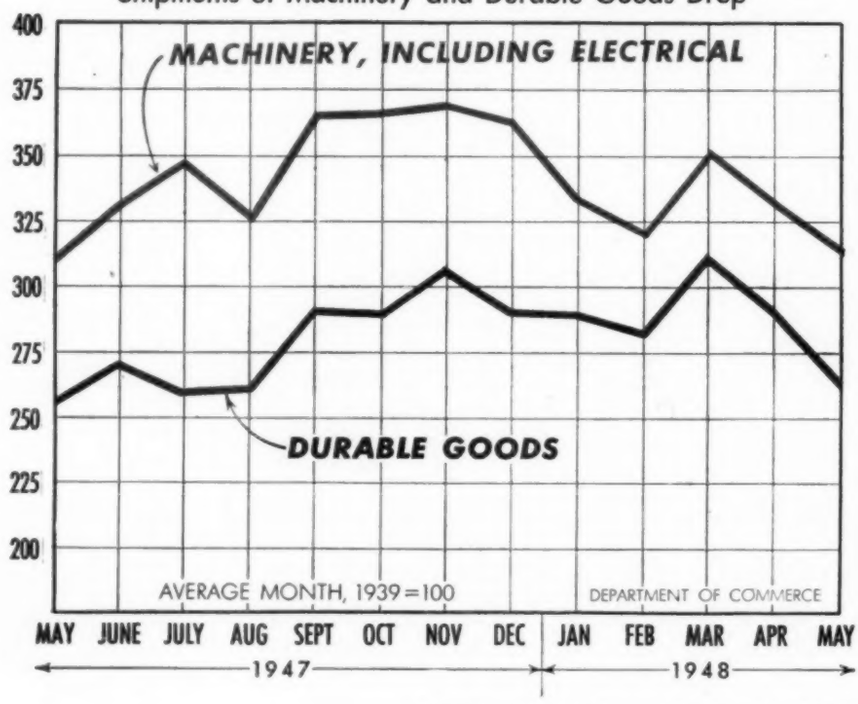
Backlogs in new orders in foundry equipment continued to show a slight increase during June, in conformity to the trend during the previous three months. Shipments of new equipment jumped from $1.6 million in May to $1.8 million in June. New orders, however, dipped slightly to $1.8 million, bringing the index down 11.7 to 376.8 in June.

Strike Losses Drop

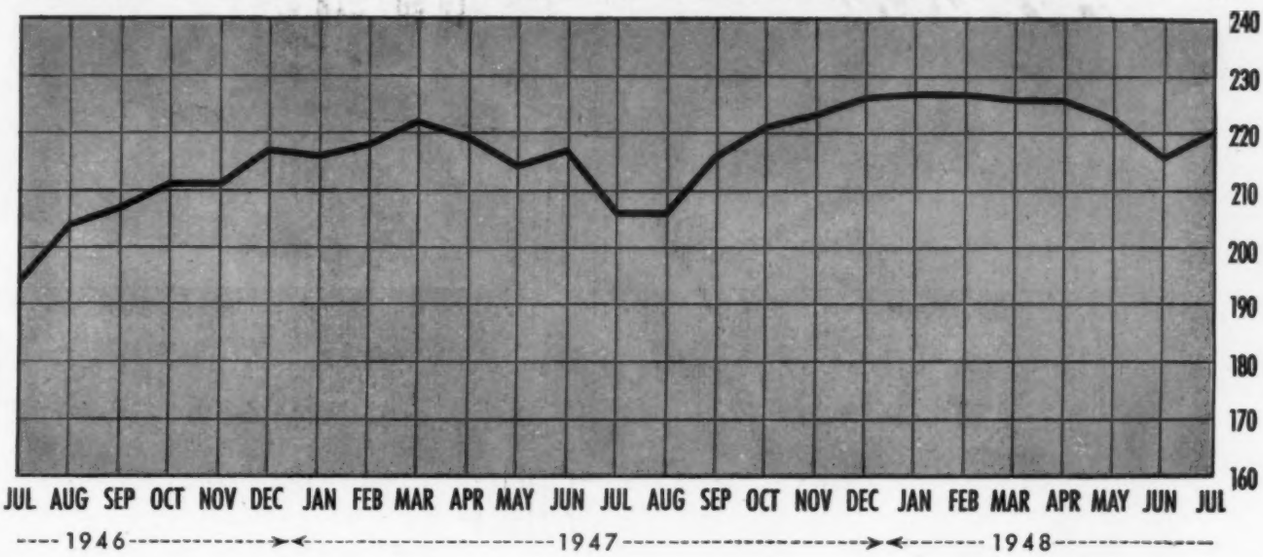
Idleness due to labor-management disputes declined to 2 million mandays in June, or half the time lost in May. Absence of strikes of nation-

	DURABLE GOODS	MACHINERY, INCLUDING ELECTRICAL
1947		
MAY	256	294
JUNE	271	315
JULY	260	328
AUGUST	261	307
SEPTEMBER	292	345
OCTOBER	291	346
NOVEMBER	307	348
DECEMBER	292	344
1948		
JANUARY	291	312
FEBRUARY	287	299
MARCH	314	329
APRIL	292	309
MAY	266	290

Shipments of Machinery and Durable Goods Drop



American Machinist INDEX OF METALWORKING PRODUCTION



INDEX		COMPONENTS				
		MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANS-PORTATION EQUIP.	OTHER METAL-WORKING
JULY 1948.....	220	250	226	229	305	147
JUNE 1948.....	216	250	227	217	282	148
JULY 1947.....	206	230	226	212	261	141

AMERICAN MACHINIST'S INDEX OF METALWORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1 Index figures are a percentage of 1939, which equals 100.

wide scope largely accounted for this drop, as the actual number of strikes increased from 275 in May to 310.

A decline of 37% in work stoppages in the first half of 1948 was reported, compared with the corresponding period of 1947.

ECA Tool Orders Uncertain

The amount of orders to be secured from ECA countries also is problematical. Some western European nations are showing an inclination to buy over here only replacement parts for old U.S. machines installed in their factories. If new machines are needed, they will come from machine tools plants in Europe or in Britain.

Whether this feeling develops into a trend will not be known until high officials of the U.S. machine tool industry have a chance to meet with machine tool importers in Europe and with ECA officials in Paris.

A clearer understanding of what the European Recovery Program will mean to the metalworking industry is expected about Sept. 15. Officials believe that by that time the 16 nations will have filed their reports on the first year's requirements. Each country's four-year program will be completed at a later date. Some $845 million is allocated for capital goods and services, with the remainder of the $5-billion allotment for this year and up to next April going into food, feed, fertilizer and raw and fabricated basic materials.

Machine Tools for Plane Engines

Machine tool bookings have been enlivened by orders for the plane engine program. While these orders as a whole have not been large, they have served to offset the business lost to individual builders by hold-up of shipments to Czechoslovakia and other Soviet-sphere countries.

The huge orders for machine tools predicted from the aircraft industry have not materialized. The question is just how big this business will be. The general feeling in the industry is that it will not come anywhere near the total expected when the plane program was started.

Equipment Buying Good

Capital equipment expenditures by manufacturers are expected to continue at about the same high rate as during the latter part of 1947 and the first half of 1948.

Increasing emphasis upon cost reduction and substitution of new products and techniques are the basis for this prediction. An even greater increase in buying of capital equipment may result if Congress changes depreciation allowances to encourage replacement of obsolete equipment.

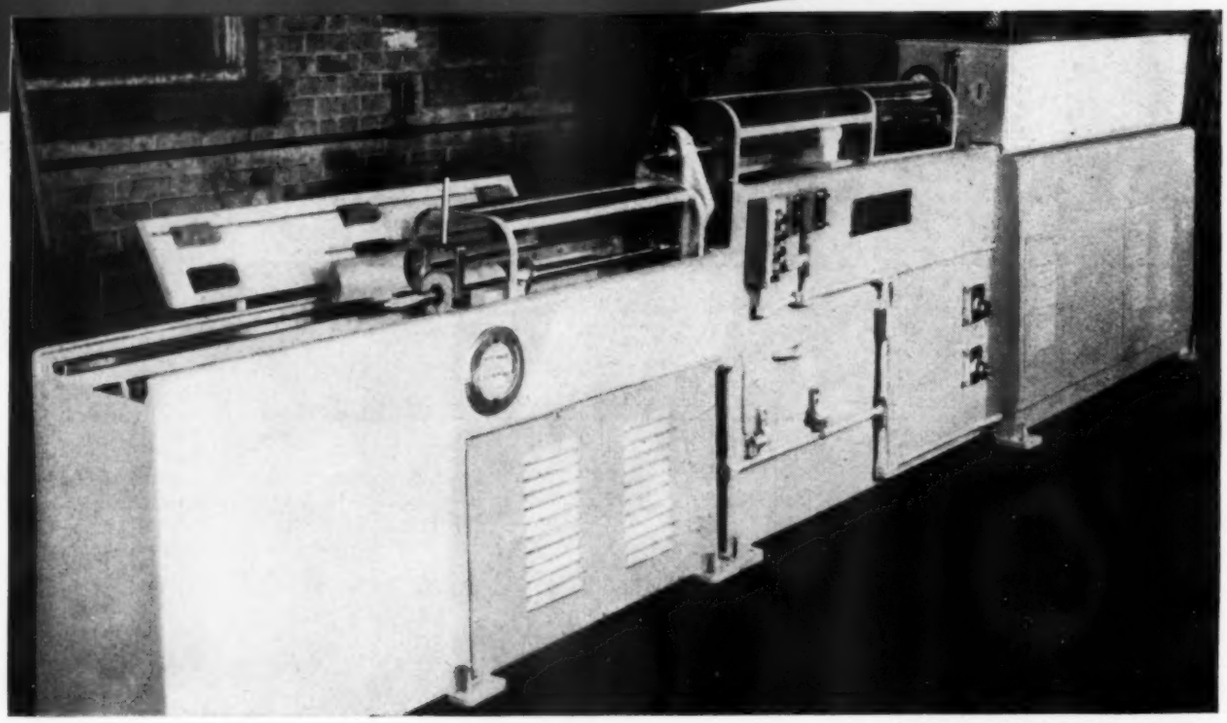
Buying Methods Changed

With material shortages evidence in practically all fields, Willys-Overland has divided its procurement division into two separate groups. One will handle the purchase of productive materials and the other the nonproductive supplies.

Auto Demand for Tools

Considerable machine tool business seems likely to come through in the domestic market. Take the automobile industry, for one. Packard will make an outlay of $5-$7 million for new tools for its automatic transmission. General Motors should buy considerable equipment, especially in the gear-cutting field. The corporation is in the process of expanding its Detroit Transmission Division.

NO RUST...NO SLUDGE
IN HYDRAULIC MECHANISMS



Horizontal Pull Broaching Machine
Photo courtesy of Lapointe Machine Tool Company

Texaco Regal Oils (R & O) are specially inhibited to protect against these trouble-makers.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Let's Depreciate Intelligently

BY ITS archaic method of figuring depreciation, our federal government is doing a disservice to the nation's metalworking industries.

In the first place, replacement of old production equipment with new costs so much more today than it did before the war that management must be convinced of a substantial saving or a notable improvement in quality before it will approve necessary purchase funds.

Once the equipment is purchased, management is required by taxing authorities to carry the new investment on its books over a long period of years. Short-term write-offs are discouraged, or denied.

Even proof that equipment will pay for itself in two or three years makes little impression upon our hidebound Treasury officials. They insist upon maintaining the myth that equipment takes ten, or fifteen, or in many cases twenty years, to pay out.

There are exceptions, to be sure. Treasury people can point to specific companies which have been allowed quick write-offs. To get such a ruling, however, management has to be willing to fight vigorously and fearlessly.

The average small manufacturer is quickly discouraged under these circumstances. He seldom has the willpower or the resources to stand up and battle for an exception to the rules.

Bear in mind that companies hurt by the Treasury Department's inflexible policy are not all big and powerful corporations. The little fellow feels the pinch just as much and probably more.

The case is eloquently stated by John H. Dowd, president of the Central Connecticut Tool & Die Association:

"Today, with high taxes and low (long-term) depreciation, the average small shop is slowly dying because of its outmoded equipment. A reversal of the Internal Revenue Department's policy on depreciation, encouraging replacement of old equipment with the latest high-production machines, would increase production, lower costs, and strengthen our whole economy."

The sentiments expressed by Mr. Dowd, who is a partner in Johns-Hartford Tool Co., are echoed by hundreds of large and small metalworking managements.

There is no plausible reason why companies should not be permitted to speed up depreciation for tax purposes. In consultation with Treasury Department agents, they should be allowed to set their own rates, as long as they stick to them once they are adopted.

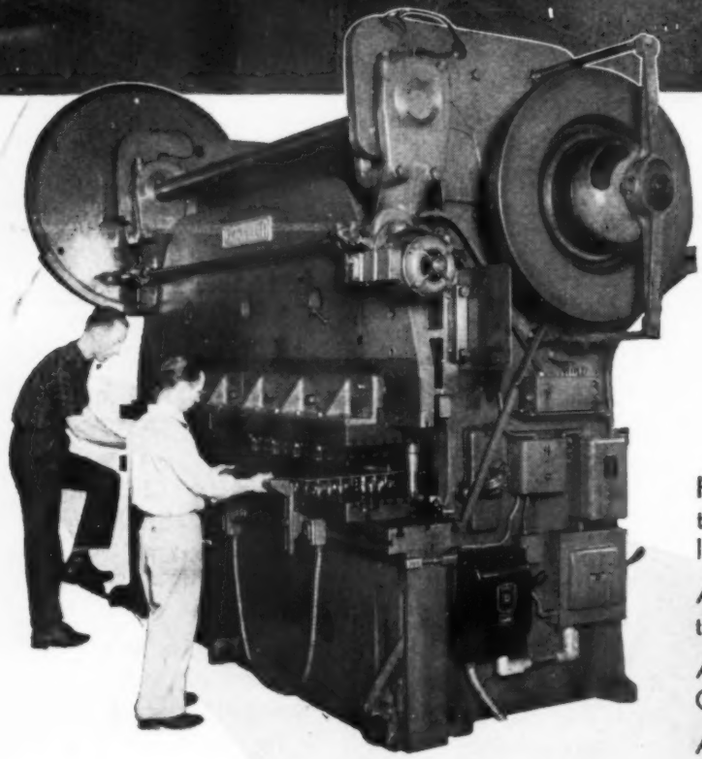
"Free" depreciation, as that policy often is called, yields just as much money to the government in the long run as the present policy. It also provides a fine incentive to management to keep its plant up-to-date.

In these days of high costs, every incentive should be given management to install cost-saving machinery as one of the factors helping to brake inflation. One of the best incentives is a 1948 streamlined depreciation policy.

Our present outmoded depreciation policy leads to technological stagnation. It is time to encase it as a museum piece and substitute a "free" depreciation policy capable of filling today's requirements.

Burnham Finney

EDITOR



● *Courtesy . . .* KIRK & BLUM, Cincinnati, Ohio

72 HOLES

where they belong

Holes must line up—or assembly bogs down. Seventy-two holes are punched in this 10-gauge sheet, accurately located by Cincinnati standard micrometer gauges.

Accurate hole spacing—accurate hole position—are maintained, and assembly is smooth and trouble free.

As production machines, or as machines for jobbing work, Cincinnati Press Brakes are highly profitable.

As a press, they offer high production with low investment. As a Press Brake, their low set-up costs, quick change-overs and versatility bring profits.

Write for Catalog B-2A for complete description of the extensive line of Cincinnati Press Brakes, with many illustrations of the diversified uses of these machines.

THE CINCINNATI SHAPER CO.

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SHAPERS · SHEARS · BRAKES

CRACKS IN PRESSES REPAIRED QUICKLY

When a repairman called in for one job stays over six months and does twenty jobs—that's news. So we asked Mr. Hillhouse to give us examples and costs. Here's his eye-witness story

By J. W. HILLHOUSE
Equipment Engineer
WORCESTER PRESSED STEEL COMPANY

Almost Any Break Can Be Fixed . . Here the section of a blankholder, into which one of the four adjusting screws fit, has been partly cracked away from the main body. The cracked section has been locked in place, braced from the bottom flange, and Metalocks are being put in. This is a low-cost temporary job to carry through until delivery of a new blankholder

In AUGUST, 1947, Metalock Repair Service came to Presteel to close and lock a bad crack through the toggle-shaft bearing in the crown of a 4-tie-rod, straight-sided, double-action, 340-ton toggle press. The repair proved satisfactory and avoided replacement of the press crown. Cost was $1000, and the press was out of service for four days including a weekend. To replace the crown would have cost $2750 for the new crown, plus an estimated down time of three months, plus complete dismantling.

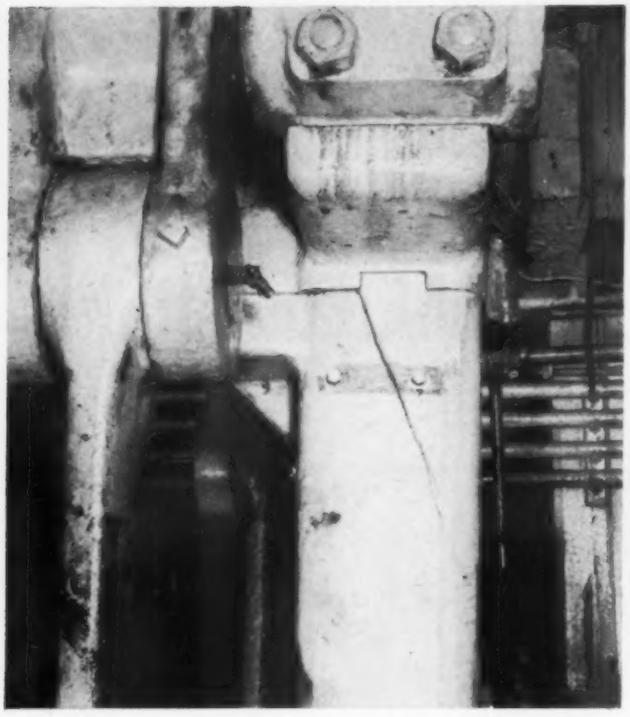
In November, Metalock repaired the gibs on the back side of both A-frames of our 1000-ton toggle press. Both gibs were split and ready to break away from the A-frames. This repair cost $900 and took a week. Two new A-frames would have cost $5100, plus a down time of five months, plus complete dismantling.

Such obvious savings led to a checkup on all presses and repair of all important cracked sections. To date, some twenty presses have been put back in shape by this patented process.

Metalock was originally developed by a mechanic in Texas to repair automobile engine blocks. It can be used, however, to repair broken press frames, crowns, blankholders, base castings, or other cracked or broken machinery sections. It requires much less time to get machinery back into service, generally requires no application of heat, and can frequently be done with minimum dismantling. Typical examples of these repairs are shown.

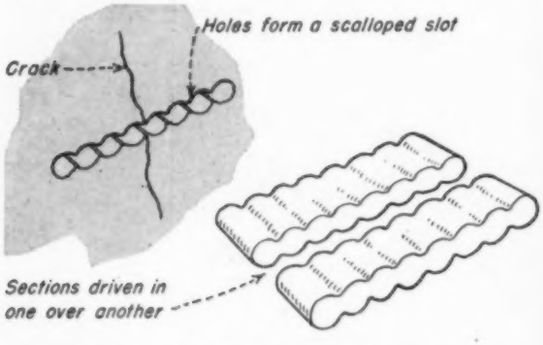
PLEASE TURN PAGE

• HOW A SIMPLE CRACK IS REPAIRED

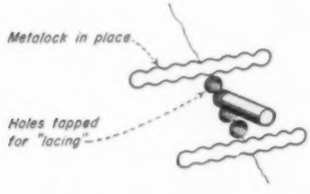


1 The Crack . . A diagonal crack in the column of a 4-tie-rod, double-action toggle press. First step is to close the crack, done in this case by applying pressure by hydraulic jack against the back of the cracked column

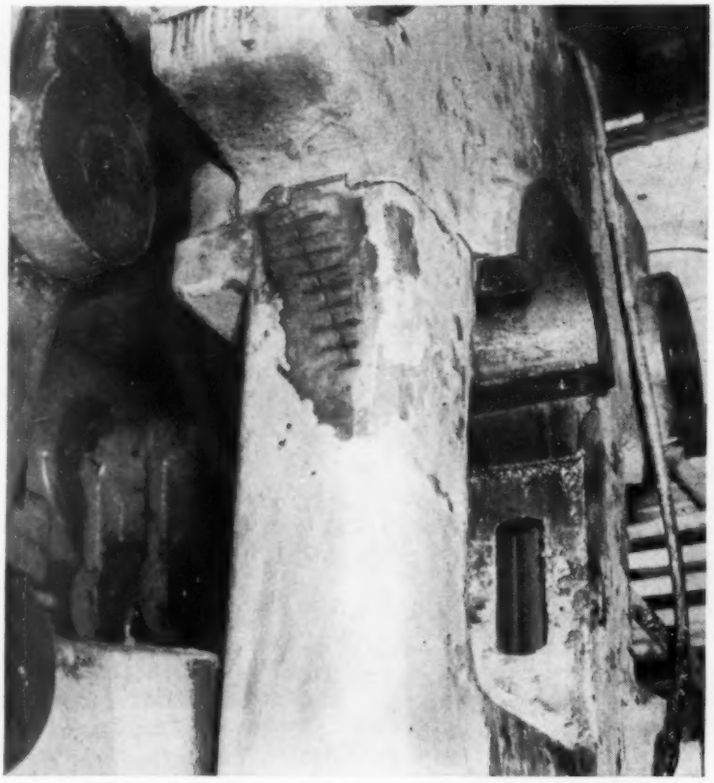
2 Preparation . . Lines of holes are templet-drilled across the crack an inch or more deep and metal between holes broached away to leave a scallop-edged slot. Scalloped locking strip, cut to length, is driven into the slot in layers



3 Locking . . An air hammer drives each lock home and spreads it tightly into the slot; so each strip, when hammered, prestresses the lock beneath it. Each strip is long enough so it will fail in tension before it will pull out—in this case 5000 lb. per strip

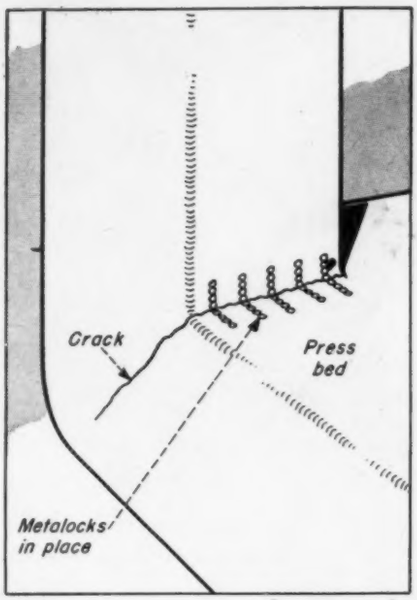


4 Lacing . . After locks are in place, holes are drilled and tapped in the crack itself, between the rows of Metalocks. Into the tapped holes are screwed threaded rods. These are, in effect, secondary keys, preventing the parent metal from shifting

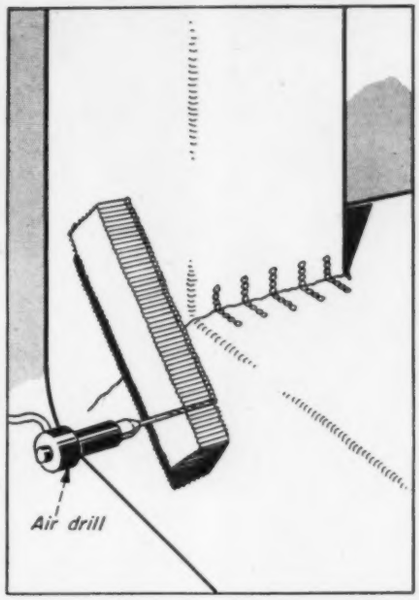


5 Finished . . Both Metalock and Metalace have been installed and surfaces ground smooth ready for painting. No heat was applied to complete this repair, done in three days at a cost of slightly over $200 and guaranteed

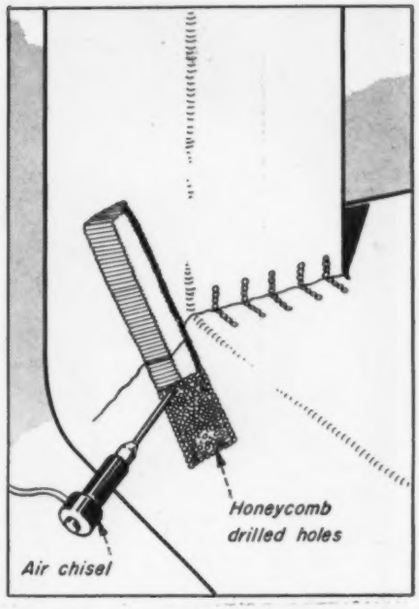
•WHEN EXTRA STRENGTH IS NEEDED



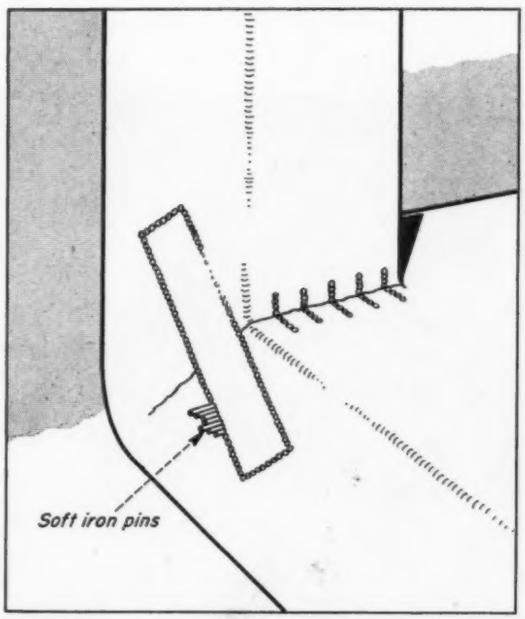
1 Cracked Frame . . Crack between bed and column sections of frame has already been closed and locked with regular Metalocks driven in at an angle to span the crack. Additional strength is required. To provide it, a Masterlock bar is inserted



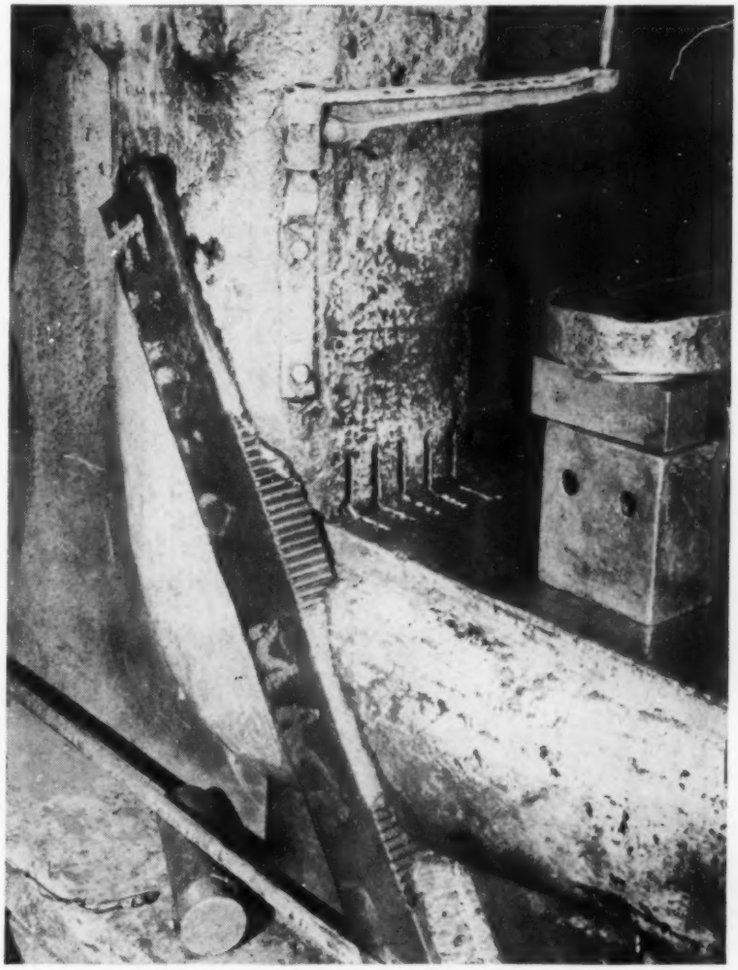
2 Socket Drilled . . Scalloped edges of the Masterlock block provide a templet for drilling outline holes in the press frame. Then a honeycomb of holes is drilled within the outline to a depth sufficient to allow insertion of the lock block



3 Cavity Cleared . . The honeycombed area is chipped out with an air hammer. In this case, the lock is made long enough so it can be welded to a bar below the shoulder of the press, as shown in the final photo of this group, which provides added strength.



4 Lock Block Pinned . . After the Masterlock is inserted, soft iron pins are air-hammered into the series of "holes" resulting from mating the half-holes drilled in the parent metal and the scalloped edges of the lock bar. These pins anchor the lock in place

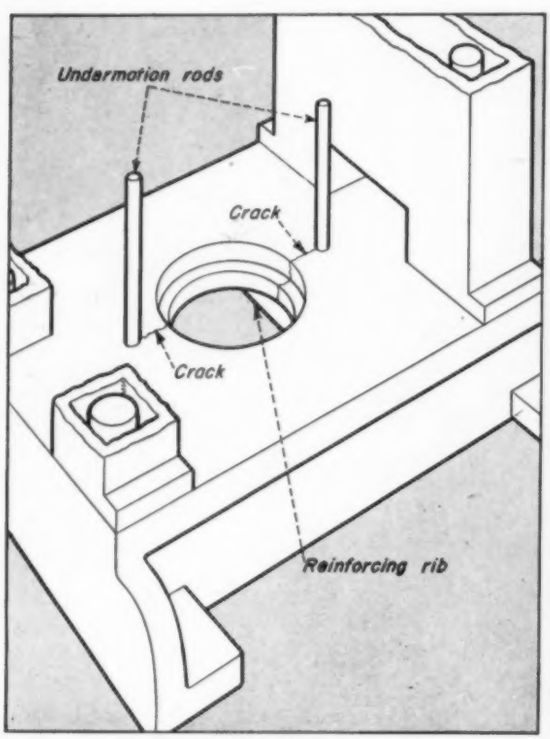


5 Finished Repair . . Here the Masterlock bar is welded to a heavy plate anchored under the shoulder of the gap. Pins have been driven along the sides of the Masterlock. The press is already in use, producing small stamped bicycle part

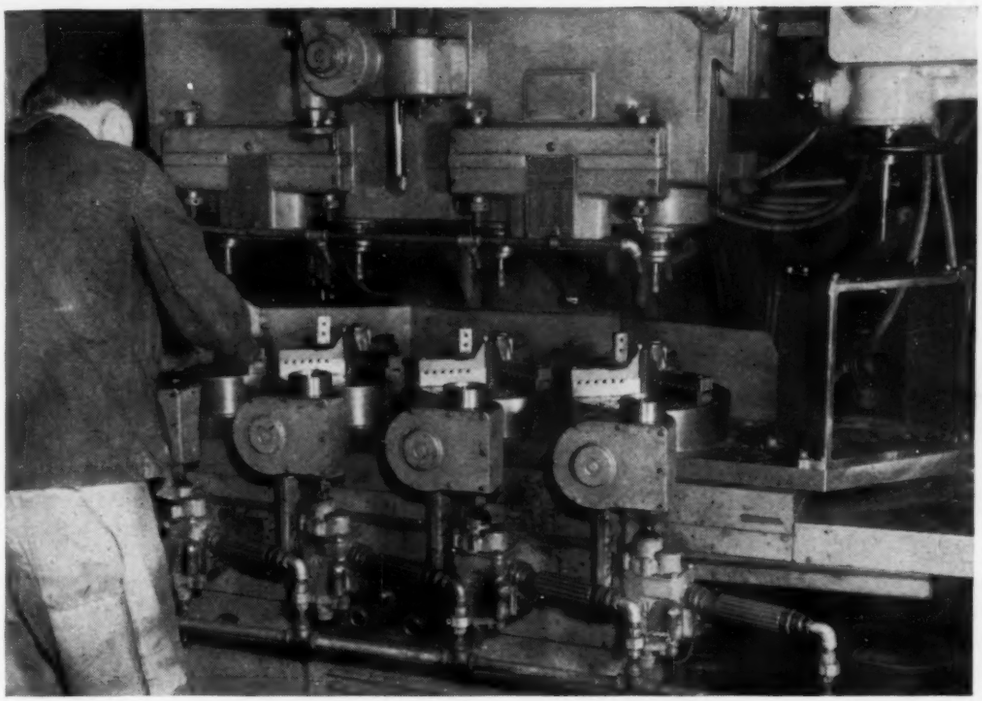
PLEASE TURN PAGE

MENDING A GAP FRAME . . The upper part of the frame on a small 90-ton gap-frame press was almost broken off. The Masterlock, a much larger steel insert, has been applied at the point of greatest stress to supplement the locks and laces

ROUNDING A CURVE . . On the curved inside surface of the press, the lock bar is put in in two sections, each pinned tightly, then the sections are welded together. The weld does not, however touch the cast iron of the frame



WITHOUT PRODUCTION LOSS . . This 500-ton press is in constant use on heavier stampings, producing among other pieces an important auto component. Thus, the crack through the middle of the bed from one undermotion-rod hole to the other had to be repaired a little at a time. In addition to locks and laces, a 2x8-in. steel bar was locked to the underside of the cracked reinforcing rib at each side of the hole and braced into the feet of the press. Cost was only $2100, as compared with $3700 for n new bed, plus downtime and labor



Four standard scroll chucks are bolted to the baseplate of fixture for milling entrance slots in ball-bearing housings. Air motors that operate chuck jaws are connected to chucks through right-angle gearboxes. Operator is positioning one piece; other three are on the gearboxes

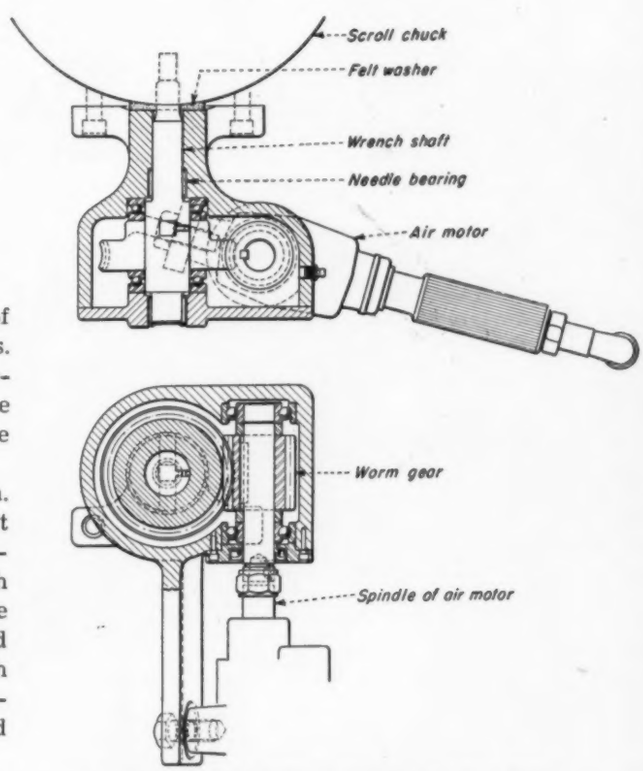
AIR MOTORS OPERATE SCROLL CHUCKS ON MILLING FIXTURE

BY LEONARD C. HEINLEIN, Assistant Superintendent, Dodge Plant
Ball & Roller Bearing Division, Link-Belt Company

SHALLOW entrance slots are milled in opposite sides of some ball-bearing housings for Link-Belt pillow blocks. These cast-iron housings are milled four-at-a-time on a four-spindle Cincinnati Hydro-Tel profile miller. Work traverse in relation to the cutters is controlled by a slotted cam plate and a profile attachment at the right of the machine.

Table fixure is a large steel plate on which are bolted 10-in. dia. three-jaw scroll chucks spaced for accurate alignment with the four milling spindles. Chucks are operated individually by standard Ingersoll-Rand air-drill motors through right-angle-drive gearboxes bolted to the front of the fixture baseplate. Final driveshaft in each gearbox has a square end permanently fitted into a wrench socket of the chuck. Both gearshafts in the drive box are ball-bearing mounted. Control-valve arm of each air motor is conveniently positioned for easy operation when chuck jaws need adjustment.

Production with this setup is considerably higher than it was with conventional work-holding fixtures on a single-spindle vertical miller. Present arrangement takes care of 30 different housings, chuck jaw inserts being changed to suit different castings.



Each Right-Angle Reduction Gearbox has driveshaft extension with square end that fits wrench socket of chuck. Air-motor handle is machined to suit support bracket and motor is bolted in position for accurate alignment of its spindle with gearshaft.

SKIMMER DISKS PRODUCED FASTER BY SPINNING

6000 cream-separator components per day

processed to close tolerances

by high-production setup at McCormick-Deering

BY G. H. COTTRELL, Richmond Works Manager,
INTERNATIONAL HARVESTER COMPANY

STAINLESS-STEEL sheet stock is formed into skimmer disks for McCormick-Deering cream separators by streamlined, automatic operations. Instead of going through six punch-press draws to form the 90° truncated cone, the disks are spun in one pass by a 5½-in. O.D. carbide-faced roll. This also eliminates annealing.

High production of 6000 per day required that equipment design be of the best. Under L. W. Court, works engineer at the Richmond (Ind.) plant, the tooling program produced outstanding results.

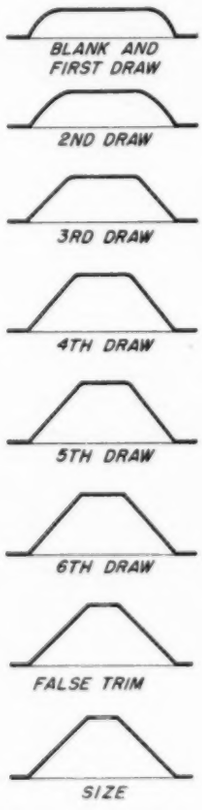
The larger of two disk sizes is blanked and center-punched out of 0.0245-in. stock. A square driver in the spinning machine engages the square hole in the blank. Hydraulically operated, the spinner rotates on a water-cooled shaft in an automatic cycle. The spin produces a cone straight on the side to 0.003 in., and the angle is true to within ±5 minutes.

Four "wash-rod" holes are punched in the conical surface by a hydraulic machine that is fitted with an electric eye for operator safety. Disks are handled by suction-cup-tipped rods because they are hot after spinning. After a second spin on an inverted-die machine to form the flange, a punch press trims flange and center hole.

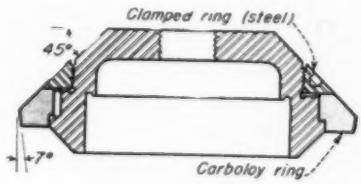
The next operation, spotwelding spacer buttons to the inside wall of the disk, is coupled with a V&O press that forms the buttons and feeds them to the welder. After welding, the buttons are deburred.

The fine matte-satin finish on the disk surfaces is produced in converted Leland-Gifford drilling machines. Two arbors are filled with disks and are attached to the machine. Helical gears on horizontal arbor-engaging spindles are powered by the drill spindle. Rotation of the disks in the polishing mix—a silica sand and water "soup"—for 1½ minutes in each direction is automatic.

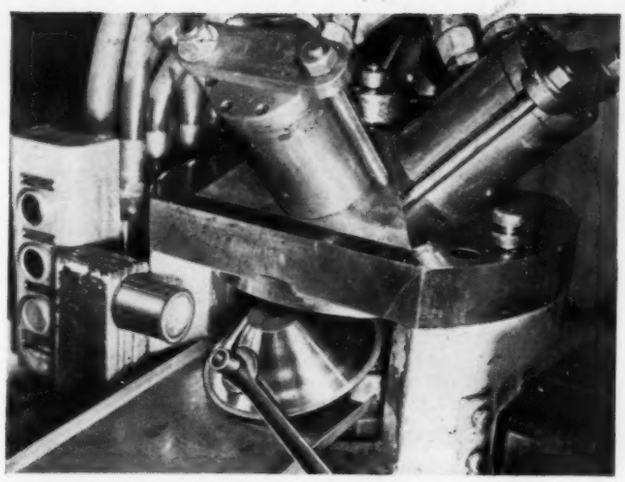
Before the disks are unloaded from the arbors they are dipped in hot water for cleaning. Unloading is done by a special nut-loosening fixture which holds the nuts and rotates the arbors until the two are parted. Polished disks are delivered to a Toledo press where the buttons are bumped to correct height between hardened-steel punch and die members. This insures correct stacked height in the cream-separator assembly. A final punch operation trims the disks to size.



Automatic spinning machine performs function of six punch-press drawing operations that previously formed truncated-cone shape of stainless-steel skimmer disks. Operator removes hot disks after forming with suction-cup grip

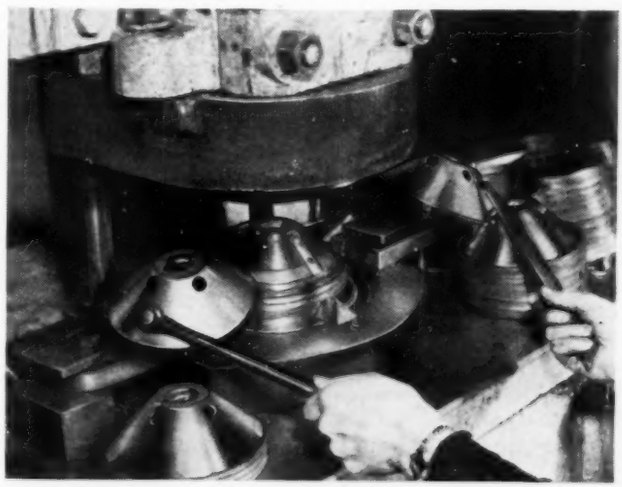


G-779 Carboloy-faced roll replaces bronze rolls in spinning. First set lasted six months before dressing

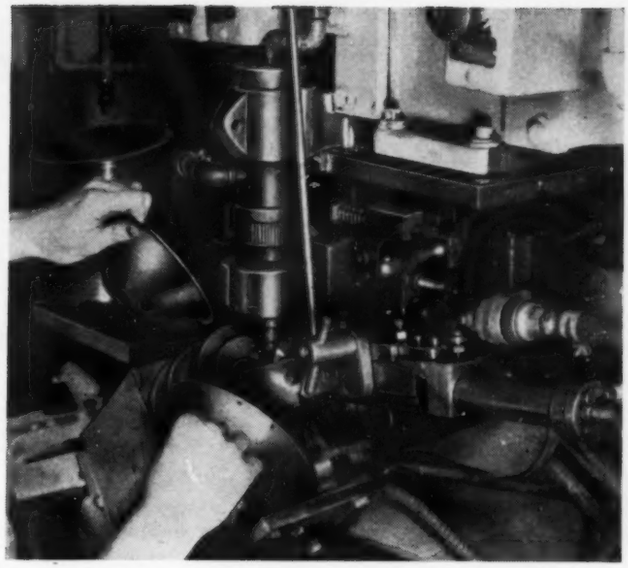


1 **"Wash-rod" holes** are punched in disk wall by hydraulic unit. Clamps allow removal of punches for sharpening. Electric eye protects operator

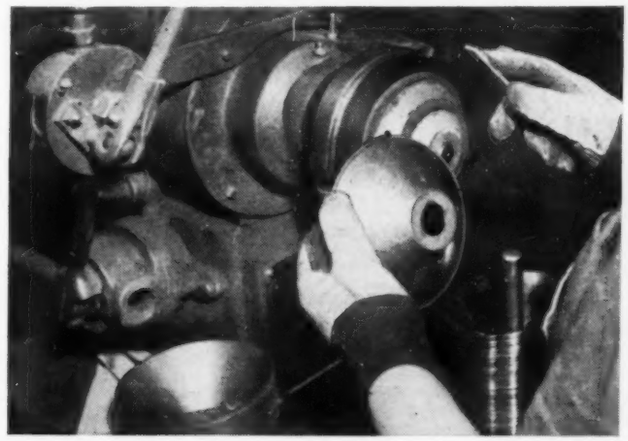
2 **Cone flange** is rolled to thickness of wall by second carbide-faced spinning tool. Machine handles output of two cone spinners



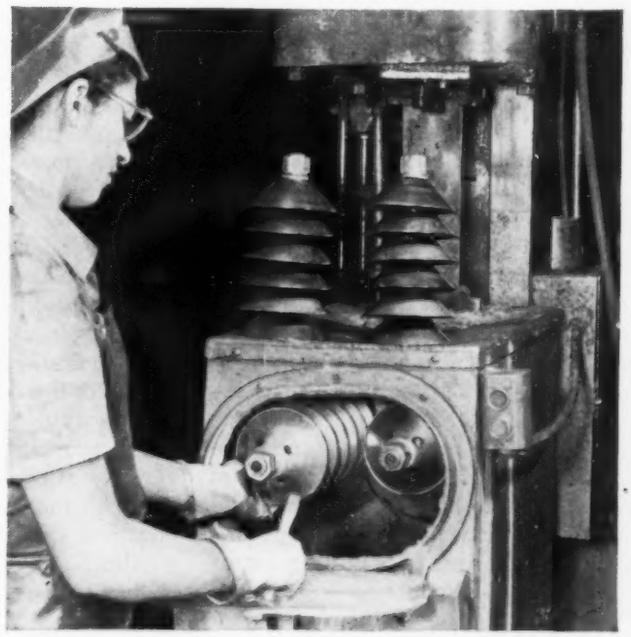
3 **Center hole and flange** are trimmed in punch press. One "wash-rod" hole locates on diamond die pin



4 **Pneumatic spotwelder** locates and welds spacer buttons inside cone. Twelve buttons are set in two rows



5 **Pneumatic chuck** on polishing lathe holds disks for high-speed deburring. Operator uses abrasive stick



6 **Converted drilling machine** rotates arbors of disks in soupy, silica-sand-and-water mixture for polishing

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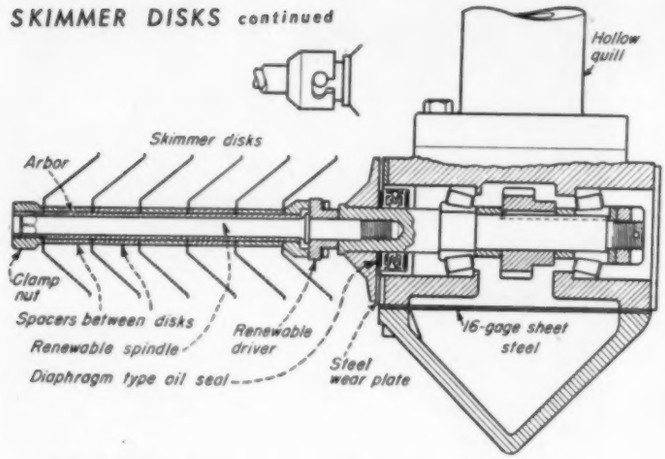
SKIMMER DISKS continued



7 **Polishing head** rotates in automatic cycle. Air pressure keeps sand out of immersed gearbox

8 **Machine-driven wrench** removes nuts from arbors. Clamp holds nuts and powered spindles revolve

Why Do Apprentices Quit?

BY WM. F. PATTERSON

Director, Bureau of Apprenticeship
U. S. Department of Labor

ONE of the most serious problems facing the metalworking industries today is the proper training of tomorrow's mechanics. Some severe criticism has been leveled at the unions for their restrictive policies, limiting the number of apprentices that may be hired in any plant or any industry, but the same charges could also be made against employers who refuse to undertake any apprentice training program.

In all fairness it must be stated that in very few instances has union insistence on a fixed journeyman-apprentice ratio been established without due regard for local conditions, and it cannot be denied that there are employers who would be capable of hiring an excessive number of apprentices as a means of obtaining a supply of low-cost labor.

One of the chief complaints is that apprentices frequently fail to live up to their obligations and quit after a few months and even after two or three years after starting. For at least part of this training period an apprentice represents an expense to the employer for rarely does he actually earn his pay during the early stages of his training. If an employer is to undertake the obligation of training an apprentice he should at least have some safeguard against this becoming a drain on his income. As a matter of fact, excessive turnover in any group of employees is costly. Statistics of the Bureau of Apprenticeship of the Department of Labor indicate that more than 25% of all registered apprentices fail to complete their training. Both employers and labor should be anxious to reduce this item of needless cost.

The problem is becoming one of such proportions as to require serious study. The question is, why do many apprentices fail to continue their training until completion? The reason most commonly expressed by those apprentices who quit is that they prefer to take some other kind of job. Many other reasons are also given such as: To re-enter the armed forces; to go back to school; G.I. subsistence ran out; do not like to attend related instruction classes; and others. The question may well be raised, however, as to whether these stated reasons represent in all cases the true causes or whether they are only surface indications of more serious underlying causes. If this is the case, it would seem that there is need for much more care in the screening and selection of applicants. An excessive turnover rate of apprentices would indicate that those in charge of the training program should be constantly on guard to see that the apprentice is actually getting all-around skilled training and is not allowed to stagnate on any single production process. Consequently, more attention should be focused on the problem of training as well as screening of applicants, not only by the employers but by the skilled workers themselves.

The Labor Department's Bureau of Apprenticeship is making a study as to basic reasons why some apprentices fail to complete their apprenticeship. As an aid to this study, the Bureau of Apprenticeship would welcome reports from Joint Apprenticeship Committees and industrial establishments concerning any investigations relative to apprentice turnover.

How to Evaluate Supervisory Jobs

BY OREL R. WINJUM,
Wage and Salary Specialist
LOCKHEED AIRCRAFT CORPORATION

JOB evaluation has received much publicity as a means of determining the relative worth of non-supervisory jobs. Yet there is little information available on plans for top-flight supervisory personnel.

In spite of this, Lockheed Aircraft Corporation decided to evaluate all supervisory jobs, excluding only the officers of the company. Starting from scratch, Lockheed developed a program that appears to have given highly valid, reliable and acceptable results.

The program applies to jobs at levels ranging all the way from $2730.00 per year up to $14,560.00. It covers all branches of the company, including, manufacturing, sales, finance, engineering and administration.

The details of the program and the principles upon which it is based are explained in this special report. This information is presented as an example of how job evaluation principles can be applied to supervisory jobs including those on the higher levels. The concepts that lead to the success of this program can be of value to other companies seeking a just solution to their salary determination problems.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

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Outline of the Program

IN OCTOBER, 1946, the wage and salary department was requested to evaluate all supervisory and managerial jobs of the company (excluding officers). By this assignment, the department was charged with a fourfold responsibility.

1. To create an appropriate supervisory job evaluation plan.
2. To obtain necessary job data.
3. To evaluate each supervisory and managerial job.
4. To develop a sound supervisory salary structure.

This responsibility imposed a corresponding duty of securing the necessary cooperation of the managing and executive personnel of the company. Their participation in the program and their critical review and acceptance of the results was essential. Without it, the assignment could not be accomplished effectively. From the very beginning, therefore, the project was planned to enlist the help of all levels of management in the gathering of job facts and the making of necessary evaluation judgments.

To expedite the project, it was decided to start the obtaining of job evaluation data with respect to the jobs to be evaluated *before* the evaluation plan itself was formulated. In this way a considerable amount of time was saved.

. . . takes advantage of good will

Collection of Evaluation Data

Planning the Questionnaire

BECAUSE of a very limited staff and the time element, it was necessary to obtain job facts wholly by the questionnaire method, rather than by interviews and desk audits. This required that a good deal of study and attention be given to the development of a form that would provide the greatest possible amount of job and job evaluation information.

Questions on the form had to be aimed broadly to obtain information that would be pertinent and useful in evaluating the jobs under any potential factors that the evaluation plan might include. Actually, questions that did not bear directly on the factors subsequently incorporated in the final plan were found to be good conditioners in qualifying judgments made in the evaluating process.

Two forms were required. The first, Duties and Functions Description Sheet—Supervisory Position, is typical of forms for obtaining information from which job descriptions are written. It requested such information as overall functions of the unit supervised, activities of the unit and job duties. The form does not offer anything new in the field and the details of its construction will be omitted from this report.

The second form, Job Evaluation Data Sheet—Supervisory Position, represents an advance in the technique of collecting evaluation data. A complete list of the questions it contains is presented in the last section of this report. On the actual form, space for the answer is provided below each question. This questionnaire was developed with specific considerations in mind.

In previous attempts to obtain evaluation data by an objective questionnaire (check sheet, yes or no, completion, etc), the company had found that such a form did not provide adequate basic evaluation information. The main body (part I) of the Job Evaluation Data Sheet, therefore, was made up of directed subjective questions. These were specifically developed to provide basic job-content evaluation material on a free-answer basis. The limitations of a subjective questionnaire were recognized, however, and were taken into consideration in the design of part III of the form.

It was appreciated that if questionnaires have to be answered persons generally like to answer the objective type. It was decided to take advantage of this good will as far as possible. It had also been observed that persons in supervisory and managerial jobs had a great dislike for, and a good deal of difficulty in breaking down jobs on the basis of task, or activity, or function, with the corresponding time, or percent of time for each. It was decided, therefore, to list objectively the main elements of purely supervisory and managerial duties (Job Evaluation Data Sheet, part II). This reduced the problem of response to this phase of inquiry largely to estimating time on fairly concrete items and took away the vexing problem of self-naming and sequencing the items.

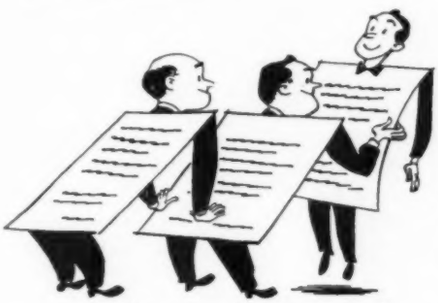
The "Evaluation Control Sheet" (part III, Job Evaluation Data Sheet) was devised for a twofold purpose. First, it was to serve as a check, on an objective basis, of the information given subjectively in part I of the questionnaire. It was planned so the person filling out the form could, when checking items in part III, recognize answers that were inconsistent with those he had given in part I. He could then think about the questions, and answer both parts consistently. Or if the answers on the control sheet were left inconsistent with those on part I, the wage and salary staff could better evaluate these responses.

The second and primary purpose of the control sheet was to obtain the assistance of the managing personnel as far as possible in the

actual evaluation of the jobs. The items were so graduated that by checking the items the supervisor expressed his relative appraisal of the job checked. Without this utilization of the knowledge and judgment of a large part of the company's managing organization, it would have been impossible for the wage and salary staff to have arrived at an acceptable, valid and reliable end product within the necessary limitation of methods, time and staff.

Value of Control Sheet Technique

We believe this evaluation control sheet to be a noteworthy development and a contribution to the field of job evaluation. By experience, it has seeming merit for several reasons.



. . . judgment can be compared

1. *It provides an economical method by which managing personnel can participate in the evaluating process.* Managers can participate at their own time and place, largely at their convenience, and therefore, without interference with pressing operational duties. By contrast the conference method, in which a committee, including managers over the affected jobs, acts as evaluator, is extremely wasteful. Such a method usually involves "arranging" time, "travel" time, "wait-for-the-other-fellow" time, "social-amenities" time, "explain-the-problem" and other inherent time-stealers.

2. *It provides a means for wide-scale participation of company personnel in the evaluation process.* Ordinarily, the best that can be accomplished by the conference method is limited participation by representation.

3. *It obtains recorded judgment on all jobs by uniform items which can be compared by organization segments or company-wide.* Unsound, unrealistic, or "padded" judgments can be spotted and discredited by reference to many recorded judgments on like or superior jobs.

4. *It provides an insight to the thinking, feeling, and standards of value of the individuals checking the items,* and to differences in viewpoint among various segments of company organization. This is extremely valuable in itself, regardless of whether the criteria of the individuals are sound or not.

5. *It is particularly suited to evaluating supervisory jobs.* because it provides a chain of evaluation judgments by managing personnel on different levels in each major company activity. For instance, the vice-president, charge of manufacturing prepared the control sheet for the works manager, the works manager for the superintendents, the superintendents for the foremen.

The developed forms were first tried out on the managerial staff of the Director of Industrial Relations. In this manner, ambiquities as to wording and intent of questions were cleared up. The trial also served to test whether or not the space for answering the specific questions was adequate. Further, the questions of those who filled out the form brought out those matters which needed explanation and discussion before distribution. After benefiting from these experiences, the questionnaires were put into final form.

Securing Job Facts

Prior to distribution of the questionnaires, a meeting was held with the top executives in each branch and their subordinate managers. The meeting was held to explain the purposes of the survey, to specifically outline the type of information that was requested and to answer any questions.

It was impressed upon these groups that the results from the program would depend to a great extent upon their providing sound factual information and that the

. . . to explain the purposes

task was not an easy one either for them or their subordinates.

In addition, a filled-out sample job evaluation data sheet was made available to demonstrate the type of information desired. This sample was developed for the manufacturing branch in cooperation with one of the factory superintendents.

In respect to the Duties and Function Description Sheet, it was left up to the respective management of the various branches as to whether the individual or his immediate superior should prepare that information, but in all cases the signed approval of the immediate superior was required. However, on the Job Evaluation Data Sheet, it was required that the immediate superior, or higher, fill out the form and sign his approval.

Keeping Data Current

Because of the rapid flux and change in jobs, it was found necessary to set up a control function so information obtained through the questionnaire method could be kept current, and information on new positions be obtained as and when created.

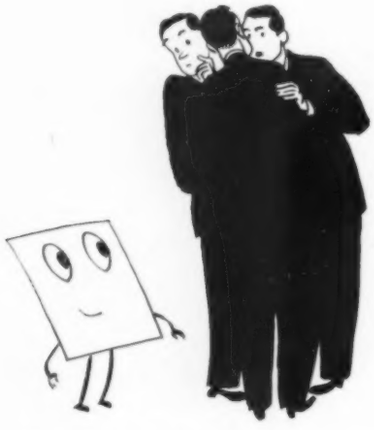
This information had to be systematically organized to keep jobs straight until the results of the evaluation program could be put into effect. In many respects this keeping current with the constant flux of organization was one of the most difficult aspects of the entire project.

Development of the Evaluation Plan

General Considerations

While the managing personnel began the task of filling out the forms, the wage and salary department began the development of the evaluation plan. The company in past evaluation programs for hourly and salaried jobs had used the point plan and found it highly satisfactory. While other types were considered, it was decided that a point plan was similarly most practical for supervisory jobs. It

was further decided that this point plan should be simple and so constructed as to provide a means of making broad judgments in respect to the degrees of value of any factors selected. Further, as few factors as were consistent with obtaining valid and reliable measures were desired to reduce evaluating time to a minimum. However, the plan had to provide sufficient factors to cover widely divergent managerial jobs, divergent as to function (for example, manufacturing, sales, finance, engineering) and as to organization-level responsibilities.



Does the factor measure . . .

Criteria Underlying Selection of Factors

Decisions were reached on the basis of answers to the following tests or considerations.

1. Does the factor cover attributes of managerial jobs that are recognized in the supply market, or by the company, as compensable elements?

2. Does the factor cover attributes that are inherent and possessed to a lesser or greater degree in all managerial and supervisory jobs of the Company? Is management willing to pay for these attributes in all of the managerial-supervisory jobs?

3. Does the factor cover values that have sufficient range or dispersion to lend itself to segregation of jobs?

4. Does the factor cover attributes that nearly all supervisory personnel recognize as important elements of the job for which compensation should be paid?

5. Does the factor measure elements of the job which are compensable apart from other elements of the job?

6. Does the factor have "social acceptability" to persons normally filling the job being measured, and to top management?

7. Is the factor a direct measure of job worth? (An attempt was made to dispense with, as far as possible, all indirect measures.)

8. Is the factor one that can readily be thought about as a whole and can readily be sized up in relation to the wide range of jobs to be measured?

9. Will top management recognize and support this factor as an important element of supervisory job value?

10. Are the factors those upon which nearly any management member could arrive at, by one means or another, a sound judgment as to the relative value or worth of his job?

11. Among the final selections are there factors to cover the major elements entering into compensation of jobs peculiar to each branch of the company organization, such as, sales, finance, engineering, legal, medical, etc., and give equal "breaks" to these jobs?

12. Do the factors "travel in the right direction" so having more of the factor in the job makes it worth more, not less, to the company?

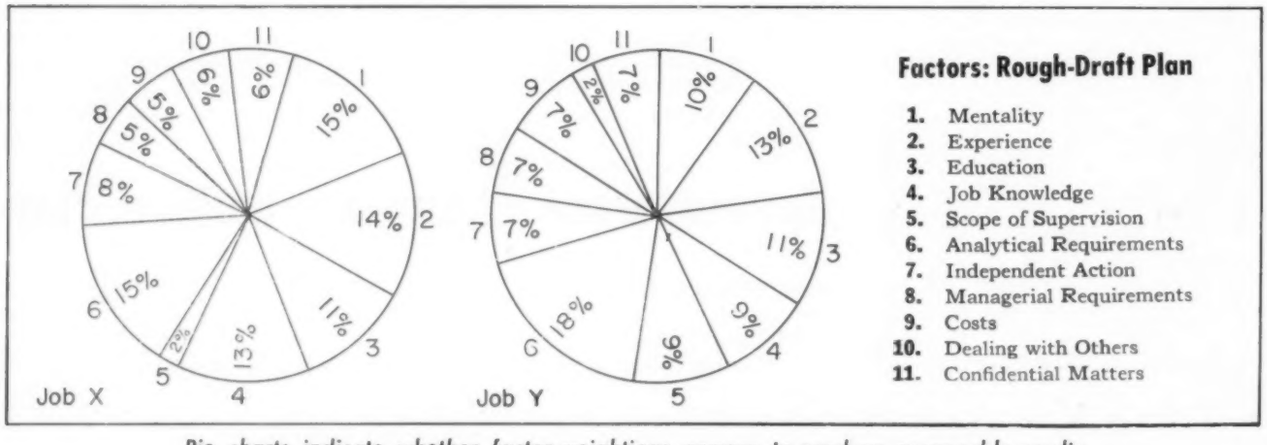
Selection and Weighting

Selection of the factors of the plan and their definition was an integral process. After the staff reached agreement on the factors and their definition, it faced the problem of discovering, defining and weighting the degrees of each factor.

Degree definitions were generally developed by keeping in mind the one job or group of jobs in the company that had the least of the particular factor attributes, that or those having the most, and then concentrating on jobs of known intermediary degrees. A series of degree definitions were thus evolved for each factor and tentative points were assigned.

These were then subjected to judgment as to the logic of progression. The logical slope or rate of acceleration of the value measured was compared to the slope resulting from the tentative points assigned each degree. The minimum and maximum values assigned to each factor were then converted to a percentage of the total minimum and maximum points of the plan and these percentages scrutinized for reasonableness.

By this time Duties and Functions Description Sheets and Job Evaluation Data Sheets were becoming available from each branch of the company. A few jobs were selected from each branch; finance, sales, engineering, manufacturing, and administration, to be evaluated by the rough-draft plan. The object of these trial evaluations was to get a cross-sectional picture of how the plan fitted the various ac-


Job X
10 11 1 2 3 4 5 6 7 8 9
6% 6% 15% 14% 11% 13% 2% 15% 8% 5% 5%
Job Y
10 11 1 2 3 4 5 6 7 8 9
2% 7% 10% 13% 11% 9% 6% 18% 7% 7% 7%
Factors: Rough-Draft Plan
1. Mentality
2. Experience
3. Education
4. Job Knowledge
5. Scope of Supervision
6. Analytical Requirements
7. Independent Action
8. Managerial Requirements
9. Costs
10. Dealing with Others
11. Confidential Matters

Pie charts indicate whether factor weightings appear to produce reasonable results

tivities of the Company, and to prove the evaluation plan.

The jobs selected ranged from top-management to first-level supervisory jobs to test the weighting of all segments of the plan. Minimum and maximum factor weightings in relation to the total minimum and maximum plan points have little significance, as it is a rare chance that any single job will be found that has minimum or maximum value in all factors.

These selected jobs were evaluated and ranked by points by branch and company-wide. The results were inspected for logic of ranking. The criteria of logical ranking were, (1) the pooled opinion of the technical staff, (2) the technical staff's knowledge of how each branch ranked the jobs, (3) conformance to unquestioned company rate relationships and to available knowledge of community rates for the jobs.

The points allocated each job on each factor were then converted into percentage of total points scored by the job. The results may be described and illustrated by pie charts of the total value of each job.

By inspection of these imaginary pie charts showing the influence of each factor in the total rating of the job, certain valid conclusions could be drawn. For most jobs, if the job functions and responsibilities are known, the major compensable elements are fairly easily identified. If these major elements appeared in the percentage breakdown of total evaluated job worth, as average or minor elements, it was apparent that the plan weightings did not properly evaluate the job. Such weightings were, therefore, worked with until the major compensable elements became major elements of total job worth under the plan.

By placing a series of these imaginary pie charts of jobs functionally related, of jobs on the same managerial level, and of jobs on different managerial levels, side by side, other valid conclusions as to whether each factor degree was properly weighted in relation to the total plan could be drawn. Information as to proper factor magnitude, range of values measured, and rate of acceleration could be adduced inferentially.

This experimentation resulted in renaming and redefining certain factors and degrees, changing the magnitude of some factors, increasing the point range of some, and changing the slope or rate of acceleration of other factors. The weightings of the plan were then crystallized in their final form as shown in the table.

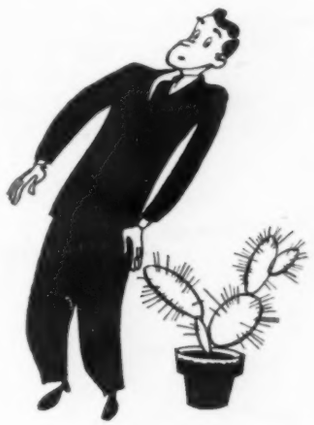
These factors and weightings were settled upon in that the plan:

1. Secured an order ranking and dispersion of jobs generally consistent with socio-economic forces entering into job pricing.
2. Was reflective of values which company management considered important and prime elements in determining relative job worth.
3. Was easy to work with, and yet produced valid and highly reliable results.

WEIGHTING OF FACTORS

FACTOR									
Mentality	Degree	1	2	3	4	5	6		
	Points	50	90	130	170	210	250		
Education and Training	Degree	1	2	3	4	5	6	7	
	Points	30	60	90	120	150	180	210	
Experience	Years	½	½–1	1–2	2–3	3–4	4–5	5–6	6–7
	Points	20	40	60	80	100	120	140	160
	Years	7–8	8–9	9–10	10–12	12–14	14–16	16–18	
	Points	180	200	220	240	260	280	300	
Applied Knowledge	Degree	1	2	3	4	5	6	7	
	Points	20	40	70	110	160	220	300	
Analytical Requirements	Degree	1	2	3	4	5	6	7	8
	Points	20	60	100	140	180	220	260	300
Judgment	Degree	1	2	3	4	5	6	7	
	Points	30	70	110	150	200	250	300	
Managerial Responsibility	Degree	1	2	3	4	5	6	7	
	Points	30	50	80	120	170	230	300	
Costs Responsibility	Degree	1	2	3	4	5	6	7	
	Points	30	50	80	120	170	230	300	
Scope of Supervision	Persons	5 or less	6–10	11–25	26–50	51–100	101–200		
	Points	20	40	60	80	100	120		
	Persons	201–400	401–800	801–1600	1601–3200				
	Points	140	160	180	200				
	Persons	3201–6400	6401–12800	12801–35600					
	Points	220	240	260					
Dealing with Others	Degree	1	2	3	4	5	6	7	8
	Points	20	30	50	80	120	170	230	300
Discretion Responsibility	Degree	1	2	3	4	5	6	7	
	Points	20	40	60	80	100	120	140	

Total Minimum Points—290 Point Range—2670 Total Maximum points 2960



. . . the kind of factors rejected

Pitfalls in Selection

In addition to knowing the basis upon which factors were selected for inclusion in the plan, it is of equal interest to know the kind of factors that were rejected.

1. *Factors that were common to all supervisory jobs but did not vary significantly were excluded.* These included many of the items usually discussed in treatises or literature on elements of supervision. They might be called supervisory job constants, which are important but do not provide the discriminatory measures basic to proper job evaluation.

Some of these rejected items are listed merely for recognition and identification as to basic type excluded; (1) responsibility for safety, (2) good housekeeping, (3) in-

duction of new subordinates, (4) training of subordinate personnel, (5) responsibility for worker growth and development, (6) developing employee morale, (7) establishing and maintaining cooperative relationships with subordinates and superiors.

2. *Factors that were found unstable because they could not be clearly defined.* For instance, it was intended that a factor be included in the plan to measure initiative requirements. Basically, such a factor met many of the requirements of a good evaluation factor. It was a requirement of all supervisory jobs, it had good discriminatory values (some jobs required only a moderate amount, others a great deal), it was a characteristic that top management and all supervisory personnel recognized as an element of job worth, and it measured both the administrative and functional aspects of supervisory jobs.

However, it was found that the word initiative brought up concepts at variance, and that even with the aid of dictionary definitions, individual concepts varied widely. It was further found that almost any words used to define initiative were as unstable as the word itself. Inclusion of this factor was therefore abandoned as impractical.

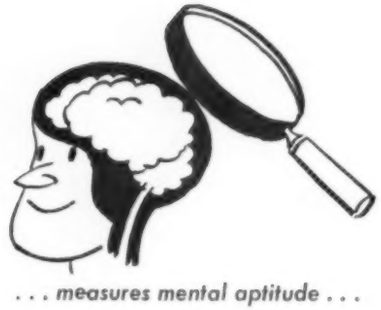
3. *Factors that carried anti-social elements which impaired their acceptance.* Reference can again be made to the factor of initiative. Because of the inherent difficulty in defining the terms of this factor, and because of widely varied concepts brought up, it seemed impossible to slot jobs without encountering violent disagreements and sense of personal affront.

4. *Factors for which it would be difficult to distinguish between what the job required and what the incumbent on the job possessed.* This is of particular importance in evaluating supervisory and managerial jobs because often there is only one incumbent in the class of position measured. In evaluating hourly and non-supervisory salaried jobs there are usually a sufficient number of different employees in the class of position to permit identifying the job as different from the individual holding the job in the majority of cases.

5. *Factors that placed value on elements that could cause inefficient company operations.* This is not an easy matter to avoid. Every factor had to be scrutinized to see that it was going in the right direction; that more of the factor in a job was worth more to the company, and not less.

By way of illustration, the staff developed a factor wherein a direct weighting in points was given for the number of each kind of worker supervised—i.e., unskilled, semi-skilled, skilled, leaders, supervisors, foremen, assistant superintendents, etc. This factor was deleted because it tended to pay for things the company did not want, rather than those it did want. A superintendent who had his work poorly organized and therefore required a great number of skilled workers, several foremen, a general foreman, and assistant superintendent would receive a higher evaluation than a superintendent with his work so well organized that it was done with unskilled and semi-skilled workers, and without additional layers of supervision.

Concepts in Selection of Specific Factors



. . . measures mental aptitude . . .

Mentality

"This factor measures the mental aptitude (native intelligence or intellect) as developed or augmented by exposure to education, experience, or other conditioning, which is required to perform efficiently in a given managerial position."

The starting point (degree 1) of this factor was predicated upon the premise that *any* supervisory job today requires at least a native capacity, or intelligence equal to the *average* of the adult population or to that of the average man in the street. This conclusion was reached from the observation that any supervisor must have considerable social intelligence to deal properly with employees, must be able to understand, appreciate and apply ethical values and has to do planning and foreseeing.

In mentally previewing all company supervisory and managerial jobs it was concluded that, as far as basic or innate learning capacity was concerned, the job required only (1) average, (2) above average, or (3) superior intelligence. This conclusion checked with the summation of actual scores that were achieved by various levels of supervision on intelligence tests administered as part of another company program.

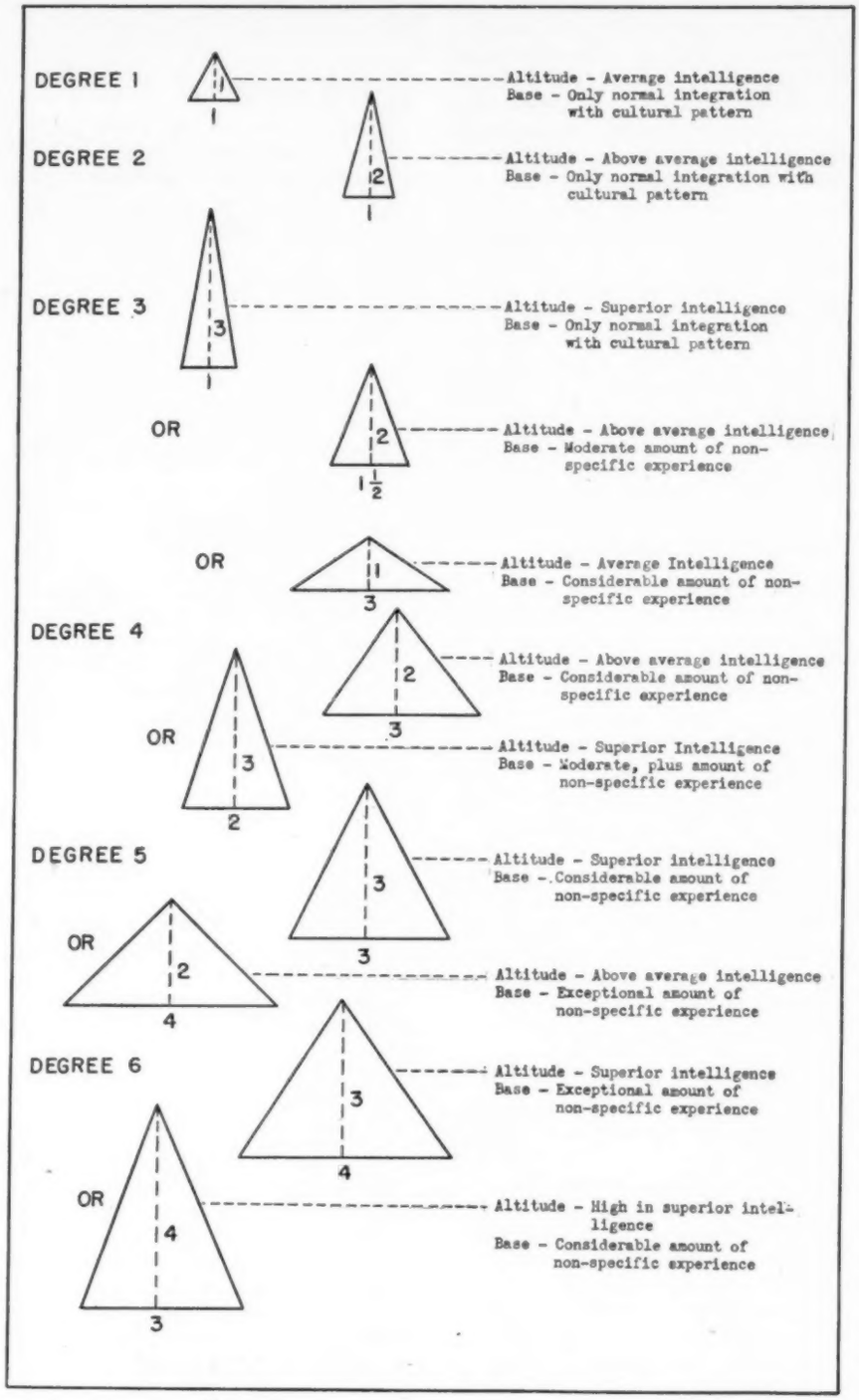
Three degrees, however, did not give sufficient dispersion in measuring the range of job values which seemingly stemmed from basic endowment. These values were (1) maturity requirements, (2) ability to deal with a vast number of situations on an action basis, (3) ability to test theory by the pragmatic approach, and (4) similar elements which derive from having integrated intelligence and non-specific experience (training and experience not related or directed toward the job in question).

This led to the concept that intelligence, or mentality, consists of the attributes of: (1) level, (2) range, (3) area, and (4) speed (the attribute of speed of response being de-emphasized). Such a concept, as opposed to a purely native endowment concept, permitted spreading out the range of values involved, and developing equivalent values for environmental training. The resulting degree definitions, and underlying concepts can be depicted by a series of triangles representing different mentality degree values.

Education and Training

"This factor measures the educational attainment, whether acquired by formal education or its equivalent, which is normally required for appointment to the particular supervisorial position."

DEGREE DEFINITIONS FOR MENTALITY



. . . measures educational attainment

The basic measurement in the degree definitions of this factor was the number of years of formal schooling required, or its equivalent. The values measured, however, were the basic learning tools, techniques, and body of knowledge that an individual must possess to be able to perform the job duties successfully.

Necessarily, what is paid for is not the years spent in schooling, but the knowledge, learning tools, and techniques that have been acquired and are necessary to forward the work and functions of some job. Inasmuch as these values could not be cataloged or classified, it was necessary to use the indirect measure of number of years schooling normally required. Estimates of schooling required suffer from traditionalization, and as was found during the war, are often grossly exaggerated. However, no better measures could be found to substitute for years schooling.

Experience

"This factor measures the amount of previous related working experience required, both supervisory and non-supervisory, to successfully fill the job. Only such experience as has been found to contribute directly toward successful performance of the job duties of the job in question shall be counted. Education and training shall not be included in estimating time under this factor. However, the time estimate assumes an individual with the selected Mentality and Education and Training. (Note: In cases where alternate kinds of experience may be qualifying for the job, the time estimate shall be based on that qualifying experience most suitable for the job in question.)"

This is an indirect measure of job value. Payment is made not for time spent in gaining experience, but for the benefits of that experience in the form of "know how" that will forward the duties and functions of a job. Company experience during the war, and that of many other concerns, demonstrated that estimates of years of experience normally required for a job were often more traditional than actual.

In this respect, it was the conclusion of the technical staff, after reviewing available evidence, that the optimum experience for any supervisory or managerial job did not exceed ten to twelve years. Beyond this point emphasis shifts to qualifications other than experience. However, in order to make allowance for the almost universal over-estimation of experience required, this factor was extended to consider the optimum required to be from sixteen to eighteen years.

Applied Knowledge

"This factor measures the degree and kind of ready knowledge that is applied in performance of job duties and in exercising job responsibilities.

Applied knowledge required varies with the scope and difficulty level of the work supervised and with the extent to which familiarity with the work is required."

Since both the factors of education and training, and experience were indirect measures of job values, and inasmuch as experiences during the war had proved both these measures to be based often on tradition rather than actuality, and inasmuch as the war period had unstabilized normal judgment ability in respect to both factors, it was decided to try to reduce the error of estimate and influences of tradition by developing a factor that would directly measure the "know how," knowledge and skill required for the job.

The underlying concept was to give value directly for "know how," as this was what the company was paying for. Evidence is that the factor accomplished its purpose, though considerable work needs to be done in cataloging and characterizing "know-how" elements before wholly satisfactory degree definitions can be accomplished.

. . . analysis to determine fact . . .

Analytical Requirements and Judgment

These factor definitions are respectively:

"This factor measures the extent to which the duties of the job inherently require analysis of data, situations and problems to determine fact, cause and effect. Consideration is given to the degree to which such analysis permits free choice or development of analytical methods, techniques, and procedures."

"This factor measures the degree to which the job permits and requires the exercise of judgment in taking action, or making decision. Consideration should be given to the extent to which actions or decisions are free from, or governed by, past practices, existing procedure or established policy; are concerned with tangible or intangible factors; and are free from or subject to, close review."

The concept behind the analytical factor was to compensate for those elements of a job that required looking over problems carefully, more or less in the nature of study, or mentally taking things apart and putting them back together again.

The judgment factor, conversely, was to compensate for those elements of a job that required action, and therefore did not permit much time in figuring out the correct answer from an analytical approach, or where analysis (usually prepared by others) was not determinative, but required supplementation by a rounded-out background, or common sense.

Managerial Responsibility

"This factor measures the kind and extent of responsibility for establishing and interpreting company and operating policies, and for planning and administering the work of subordinate organization or individuals. This responsibility does not necessarily vary directly with established organizational levels."

The factor was developed to measure and give value to the place of the job in the organization structure, based upon the actual managerial duties performed, and responsibilities assigned and exercised, without reference to the title or place of the job on company organization charts.

Costs Responsibility

"This factor measures the extent to which the job requires direct responsibility for the control of costs, or the making of decisions which increase or decrease costs to the company. Consideration shall be given to the size and nature of the units and functions controlled; the investment in personnel, product, machinery and equipment; the extent to which the job permits (or requires) effecting cost reductions. Control of costs can be affected by economical use of materials, machines, equipment and plant facilities, by efficient use of the labor force; by safeguarding company property and good will; by cost consideration involved in recommending increases or decreases in facilities and personnel, or in predicting costs, or by recommending changes in the company's products, processes, methods, procedures and systems."

The values being measured, and the purposes and objectives of this factor are probably sufficiently detailed in the definition itself.

Scope of Supervision

"This factor measures the supervisory responsibility which results from the number of persons supervised. The regular duties of this job require the supervision of:

Persons supervised directly and through subordinates (including supervisors)	Point Value
5 or less persons	20
6 to 10 persons	40
11 to 25 persons	60
26 to 50 persons	80
51 to 100 persons	100
101 to 200 persons	120
201 to 400 persons	140
401 to 800 persons	160
801 to 1600 persons	180
1601 to 3200 persons	200
3201 to 6400 persons	220
6401 to 12800 persons	240
12801 to 35600 persons	260

This setup illustrates the care required to keep values traveling in the right direction (that only such *additional units* as are worth more are paid for) in establishing and weighting the degrees of a factor.

In arriving at the above result, various aspects were explored. An attempt was made to develop a measure covering the variables of kind, number of classifications, and number of employees. This was abandoned, however, because of complexities of weighting and practical administration difficulties involved. It was ascertained that other factors compensated for all elements involved, except that of size of organization controlled. Attention was, therefore, concentrated on this element.

Weightings of comparable factors in other evaluation plans were reviewed and compensation differences based apparently on size of organization controlled were noted. As a result it was felt that this factor was normally weighted or compensated far out of proportion to value received. These weightings or compensations seemed of such magnitude as to constitute encouragement to supervisory forces to build up an empire in negation of good operating efficiency. Reasonably, compensation should not be offered for negative values.

However, it was felt that, if two or more supervisory jobs were equal in all other respects, compensable value accrued from supervis-

ing some optimum number of additional employees. It appeared from experience and observation that this optimum number varied. The addition of a few more subordinates to a small group increased the difficulty of the supervisor's job more than adding the same number of subordinates to a large group.

The problem was, therefore, to secure a proper progression unit in number of persons supervised, and a value for each unit that would stay within, and not exceed, the limits of paying for operating efficiency. To achieve this, the number of employees supervised was progressed in approximation of a normal learning curve, and point values progressed arithmetically as a straight-line function. Point values for added employees varied from a maximum of approximately four points, to a minimum of seven one-thousandths per employee supervised. Basically, the factor pays for size of organization controlled, but pays less and less as the organization grows in size. Such a premise would seem fundamentally sound.

Dealing with Others

"This factor measures the extent to which the job requires the exercise of tact, judgment, diplomacy and persuasiveness in creating or maintaining harmonious relations in dealing with others, in working cooperatively with others, and in contacting and dealing with others to secure influenced action. Frequency of contact is considered only when this element is of significant importance in the ultimate effect or results obtained. Contacts between subordinates and superior which are inherent in all managerial positions are not to be considered."

This factor was developed primarily to compensate in the overall plan for jobs where one of the primary characteristics consisted of "selling others." Most such jobs occur in the sales organization of a business enterprise, and in the major administrative and executive positions of company organization.

Selling or influencing of others in the same line of command, such subordinates or a superior, was excluded (though the worth of such "selling" cannot be minimized), as such "selling" was considered a mandatory requirement for all supervisory and managerial positions of the company. (However, from a theoretical approach a strong plea can be made that persuasive-ability requirements are greater for the "firing-line supervisor" than for other managerial personnel.)

The lower degrees of this factor emphasized the cooperative exchange of factual data, and the higher degrees emphasized the securing of influenced action and the creating of good will and confidence.

Discretion Responsibility

"This factor measures the degree to which the job requires specific responsibility for exercising discretion in releasing information, or in discussing matters with others, the disclosure of which (as to subject matter or timing) may prove detrimental or embarrassing to the company, or a violation of company confidence pledged to others. Consideration is given to the responsibility for securing compliance with confidence requirements by subordinates."

This factor was, from the standpoint of the technical staff, the most controversial as to whether or not it should be included in the plan, and what values it measured. However, the following conclusions were reached:

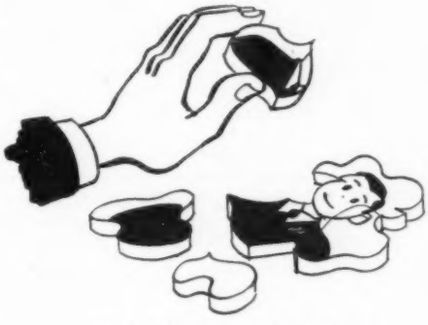
1. That almost all employees in aircraft production, supervisory, non-supervisory and hourly, from time to time have contact with, or work with confidential information,

2. That all employees are expected to hold confidential information in confidence as a normal requirement of employment.

3. That specific job responsibility and duty for discussing confidental matters with others, and for releasing confidential information in point of time, is something different from merely retaining to oneself confidential information.

This factor was included in the plan on the premise that compensation should be given for exercising good judgment when the job mandatorily requires discussion or release of confidential data and information. What is measured is the degree of judgment or finesse required in varying circumstances where confidential data must be discussed or released. The factor does not measure having possession of such data.

The Evaluating Process



. . . each job was evaluated . . .

With the job evaluation plan completed and job data on hand in the form of filled-out questionnaires, the wage and salary staff then evaluated all supervisory and managerial jobs of the corporation, except officers of the company and immediate full-time supervisory jobs over direct production activities. It had been decided, in the meantime, that these "firing-line" jobs were adequately and satisfactorily compensated on the basis of a differential over the highest paid occupation supervised.

Each job was evaluated independently by three members of the technical staff. After these results were recorded, two members of the staff jointly reviewed these evaluations and arrived at a decision combining the judgments of both men into a final evaluation sheet score.

These evaluations were then forwarded to a staff member who had the current administration of all salaried matters. These evaluations were again reviewed in the light of his past knowledge of the jobs as they had come across his desk for a period of years. He challenged any item of evaluation or the total score if it looked suspiciously out of line.

The evaluation sheet was forwarded to the department manager for a similar review. All challenged sheets were then returned to the two collaborating staff members. They checked to determine whether errors in judgment had been made or whether there were errors in the facts upon which the judgments had been based.

Establishment of the Salary Curve and Labor Grades

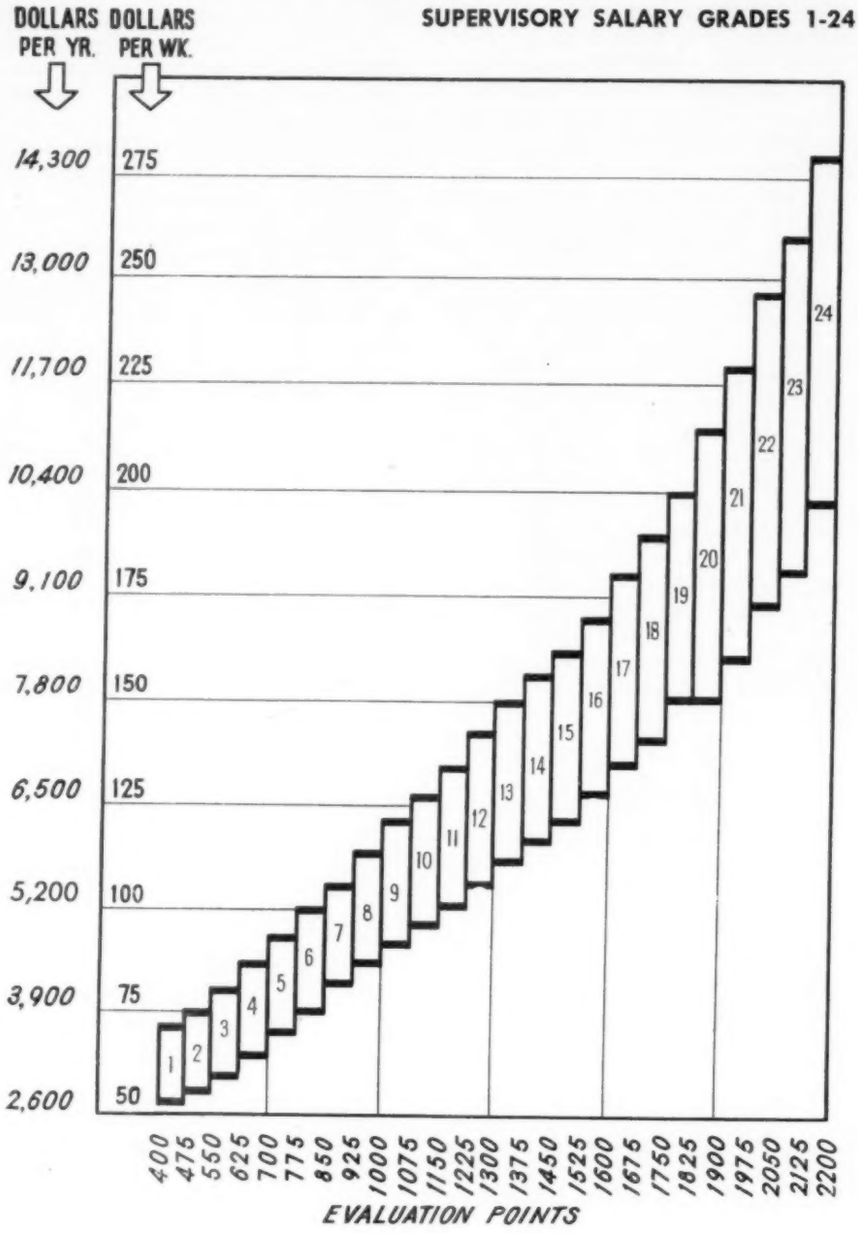
While the evaluation of jobs was in progress, the salary rate structure was developed. This is a novel departure from the customary procedure of developing a salary or wage curve after the evaluation results are in and all jobs aligned.

A number of key managerial jobs were selected for comparisons with salaries paid in other competitive companies and in the area. These key jobs were of such a character that their approximate placement in the evaluation plan could be ascertained roughly by over-all judgment. Also, from the weighting and the progression of values in each degree of the plan, the probable pitch of a proper salary curve could be predicted.

By the time the evaluation of a substantial portion of all jobs had been completed, a tentative salary curve and labor grade structure had been completed. The rate position of each job was then obtained by point-dollar conversion on the salary curve chart. This rate, obtained by point evaluation, was then checked against available industry and community rates.

Key jobs that by point-dollar conversion looked suspiciously high, or suspiciously low, in relation to known area rates, or comparison with the resulting rate for other "firmly pegged" jobs, were again reviewed to ascertain the correctness of ranking. Minor correcting adjustments were made in the salary curve.

A proper grouping of jobs into labor grades was developed by experimental trial-and-error methods, until a proper "blocking" of the evaluated jobs was obtained.



Securing Organization Approvals

Evaluation results were tabulated on summary sheets in the order of rank company-wide, and by branch: manufacturing, sales, finance, engineering, administration. These summary sheets also showed the evaluations of each job by factor degrees, the ranking of jobs by salaries presently paid and the salary ranges based on the tentative evaluation results.

These branch summary sheets were then reviewed cooperatively by the vice-president in charge of the branch (and such members of his organization as he chose), and the wage and salary manager. The ranking of jobs was approved by labor grade in this manner in each branch of company activity.

The final placement of jobs company-wide by labor grades and rates was presented to the company's junior salary board for its criticism, review and approval.

Its recommendations were in turn forwarded to the senior salary board of the company, composed of the director of industrial relations, the vice-president in charge of administration and the vice-president and treasurer, for their review and approval. At this meeting questions of policy were reviewed and determined. Included were items such as time of application, what to do with the over-the-maximum or under-the-new-minimum employees, and required approvals for future administration. Further, the senior salary board adopted the policy that final pricing of all managerial jobs evaluating above salary grade 24 (over 2274 points) should be left to the corporate officers.

JOB EVALUATION DATA SHEET—SUPERVISORY POSITION

PART ONE

Scope of Organization Controlled

1. List occupation and grade of *non-supervisory* employees (including Leadmen) reporting directly to this supervisor:

a. Occupations including grade under this supervisor | Number of employees in each classification

b. List by general type the number of machines, tools, and equipment used in, or assigned to, the unit controlled. (Note: Do not repeat if fully reported on the data sheets of subordinate supervision)

c. State generally the nature of the products produced or services rendered (parts, tools, assemblies, documents, records, reports, etc.) by the unit controlled:

2. For all units of organization controlled through other supervisory personnel, fill in the following data:

Units reporting directly to this supervisor. | Name of person in charge of unit. | No. of employees in unit.

Responsibility for Organization:

1. Does this job entail responsibility for creating or setting up the organizational unit (or units) which is supervised? Yes or No.———. If the answer is "No," explain why this is true. If the answer is "Yes" *explain in what respects and to what degree.* For example, consider such items as: *a.* Determining goal or objectives to be reached; *b.* Planning and determining work that must be done; *c.* Planning and determining labor, machines and materials to be used; *d.* Determining and installing method for work accomplishment.

2. For what controls over his organization do you hold the supervisor responsible? (For example, consider what, and in what manner he is held accountable for such items as: *a.* Compliance to established policies, methods and procedures; *b.* Quality control; *c.* Control of physical layout; *d.* Operation and operation sequence; *e.* Budget; *f.* Safety; *g.* Specifically assigned control duties.)

Authority and Area of Decision:

1. What formal orders, operation manuals, directives or policy statements are used by this supervisor to govern his operations?

2. State those matters over which this supervisor has final authority. (List only those items, or determinations which require no higher approval in the company.)

3. State those *recommendations* made by this supervisor which, for *practical purposes,* have the effect of final authority.

4. On what matters does this supervisor make *recommendations,* which are reviewed and decided by a higher level of authority, or by someone specifically designated by the company with the responsibility for decision in the matter? (List only those recommendations which you believe are of particular consequence, and are a normal requirement of this job.)

5. On what matters does this supervisor counsel with, or collaborate with higher or lower levels of supervision or other company personnel? (List separately those matters where (a) from a *job requirement* standpoint the influence and responsibility of the participants as to solution are approximately equal; (b) this supervisor is responsible for a phase of the problem or action mutually discussed.)

Responsibility of Costs

1. What elements of costs are directly controlled by this supervisor?

2. What elements of costs, which are not directly controlled by this supervisor are appreciably and significantly affected by his actions and judgment?

3. What typical decisions, if incorrectly made by this supervisor, would result in serious direct losses to the company?

Cooperation Required

1. With what positions or units of the company (other than in his own department) does this supervisor have important or significant contact? *State the nature, frequency, and the purposes and objectives of these contacts.*

2. Does this job require contacts with persons outside the company? *State nature, frequency and purpose of such contacts.*

Initiative Required

1. State those matters, policies, actions or methods of procedure that are required to be formulated or initiated by this supervisor.

2. What actions, responsibilities or determinations are *delegated by* this supervisor? State what they are (generally or specifically, as is appropriate) and to whom delegated.

3. State what actions, responsibilities or determinations are *delegated to* this supervisor.

Responsibility for Confidential Matters

State to what extent (if any) this job requires specific responsibility for holding matters in confidence, or for controlling release or access to confidential data.

Qualifications

1. *Experience:* What specific experience is essential to successfully fill this job? State the *amount* (in years or months) of *each kind of experience* required. (Note: Higher-rated jobs may require less specialized experience than do lower rated jobs.)

2. *Knowdelge:*

a. State what practical, trade or technical knowledge is required to successfully fill this job.

b. What specific knowledge of operations *as they are performed in this company* does this job require? State what those operations are and why such specific knowledge is required.

3. *Skill:* State operations or duties of workers supervised which the supervisor must personally be able to perform.

4. *Abilities and Aptitudes:* In order to fill this job successfully, the supervisor should have the following abilities or aptitudes (check those which you believe are essential.)

( ) Leadership Ability	( ) Analytical Ability
( ) Mechanical Ability	( ) Aptitude for dealing with numbers
( ) Incentive Ability	
( ) Creative Ability	( ) Clerical Aptitude

Add other essential aptitudes.

5. *Personal qualities required:* State those personal qualities which you believe are especially essential for successful filling of this position. (e.g., Neat appearance, honesty, cheerfulness, fair-mindedness, good disciplinarian, patience, tactfulness, resourcefulness.)

Source of Supply

1. Within the Company, the logical line of promotion to this job is from one or more of the following jobs:

2. If the supervisor were recruited from outside the Company, he normally would be expected to have held one or more of the following positions:

Additional Factors

1. List any additional factors or information which you believe is necessary to properly evaluate this job.

2. Define any special or trade terminology used in the description, which might not be readily understandable to others.

PART TWO

Estimate the approximate percentage (if any) of the total working time that this supervisor spends or ought to spend on the following activities. The activities cover only a part of any supervisory or managerial job and, therefore, the total time spent on these activities can be any percentage of the total working time.

1. POLICY DETERMINATION—Policies shall be considered as guides for decisions, conduct and/or procedure.

2. INTERPRETATION OF POLICIES PREVIOUSLY DETERMINED—Such interpretations to be for the benefit of those employees supervised.

3. DETERMINATION OF WHAT IS TO BE MADE OR DONE.

4. DETERMINATION OF WORK METHODS—Specifying the how of the work.

5. PLANNING—Determination before initiating action of what is necessary to achieve an end result.

6. ORGANIZING—Establishing order in which the work is to be performed; methods of procedure, work flow organization needed to accomplish assigned work, etc.

7. PRODUCTION DETERMINATION—Quality of work, or units of finished product, etc., to be realized.

8. STANDARDIZING OF RESULTS—Setting of standards of accuracy, "working tolerances," etc., to be attained.

9. ASSIGNING—Selection of employees for particular work.

10. FOLLOWING UP OF ASSIGNMENTS MADE—Seeing that work is done properly and within established time limits.

11. MANAGEMENT OF PERSONNEL — Pertains to personal matters of employees such as rate increases, vacations, selection of personnel, classification, grievances, etc.

12. COORDINATING—Coordinating work of the unit with other units or segments of the company.

13. BUDGETING—Work load, labor requirements.

14. REPORTING—Accounting to superiors for activities.

PART THREE

This is a control check list. All that is required, is to check the applicable items. More than one item in a group may be checked if more than one item applies to the job. If none of the items in the group apply, merely state "does not apply."

I. In this job the supervisor's responsibility for planning is for:

( ) Tomorrow's work.
( ) The week ahead.
( ) The next month.
( ) Next three months.
( ) Six months ahead.
( ) One year or more ahead.

II. Most decisions made by this supervisor are:

( ) Closely controlled by established instructions or previous decisions made by others.

( ) Only generally controlled by established instructions or previous decisions made by others.

( ) Controlled largely by statement of objective made by superior, leaving to this supervisor the decision as to method of accomplishment.

( ) Primarily to establish the immediate goals or objectives.

( ) Primarily to determine broad policies as to future goals or objectives.

III. This supervisor supervises an organization unit where:

( ) Complete organization required to carry out the assigned functions are planned by superior or others.

( ) General organization to carry out assigned functions are planned by superior or others but specific organization is determined by this supervisor.

( ) Planning of complete organization required to carry out the assigned functions is chiefly the responsibility of this supervisor.

IV. This supervisor's job requires:

( ) Mainly the following of detail orders and instructions.

( ) Mainly working to orders and instructions general in character and requiring interpretation and translation into specific action.

( ) Mainly the formulation of orders and instructions to secure proper execution of policy.

( ) Mainly the formulation of policy underlying orders and instructions.

V. Considering all supervisory and managerial positions of the company (but excluding officers of the company) this job relatively offers:

( ) Little opportunity to effect saving or cost reduction to the company.

( ) Possibility to effect saving or cost reductions, but such possibilities are limited due to many inherently fixed and unvarying elements.

( ) Great potential savings and cost reductions due to variable factors and size of organization controlled, or due to the presence of many controllable cost elements, of company-wide significance.

( ) Opportunity to effect savings and cost reductions which presumably could "make" or "break" the company.

VI. This job offers either directly or indirectly relatively:

( ) Little opportunity for increasing or affecting output.

( ) Average opportunity for increasing or affecting output.

( ) Above average opportunity for affecting output.

( ) Great opportunity for affecting output.

VII. This supervisor's job requires cooperative contacts which:

( ) Are almost entirely within his own organizational unit.

( ) Are often with other organizational units of the same department.

( ) Are often with personnel of other departments under a common authority.

( ) Are often with personnel of other departments under different authority.

( ) Are often company-wide, including officers of the company.

( ) Are often with personnel of other companies.

VIII. To successfully fill this job a person should possess:

( ) Some initiative, but it is not an important job factor.

( ) The initiative normally required for any managerial job.

( ) More initiative than is normally required for most managerial jobs.

( ) A great deal of initiative, as this is one of the prime requisites of the job.

IX. In order to successfully fill this job the supervisor must:

( ) Be able to do the majority of work operations supervised.

( ) Be able to do some of the work operations supervised.

( ) Be able to show or tell employees *how* the work ought to be done.

( ) Need not be able to personally perform any of the work operation supervised, but must be able to properly judge work performance.

( ) Have only general appreciation and familiarity with *details* of work performed in his organization.

X. Problems encountered by this supervisor are:

( ) Almost the same from day to day, and therefore can be solved largely by precedent.

( ) Basically similar in character from day to day but the specific situation requires interpretation and occasionally working out a "new wrinkle."

( ) Basically different from day to day and therefore because of changing conditions requires a great deal of adaptation and adjustment.

( ) Largely of a non-reoccuring type, where each problem requires original approach and creative thinking for solution.

XI. To successfully fill this job the supervisor must normally have:

( ) Does not require previous related experience.

( ) Requires less than one year previous related experience.

( ) One to two years previous related experience.
( ) Two to three years previous related experience.
( ) Three to four years previous related experience.
( ) Four to five years previous related experience.
( ) Five to six years previous related experience.
( ) Six to seven years previous related experience.
( ) Seven to eight years previous related experience.
( ) Eight to nine years previous related experience.
( ) Over nine years previous related experience.

( ) Related experience as such is not an important factor in this job.

A minimum of————years of experience is required but beyond this point other factors primarily determine the worth of the job.

XII. To successfully fill this job a person must normally have:

( ) At least grammar school education.

( ) Four years' high school or the equivalent.

( ) Four years' high school or the equivalent, *plus* specialized study up to one year on a full-time basis.

( ) Two years' college or the equivalent, or high school plus two years' specialized study on a full-time basis.

( ) Four years' college training or the equivalent.

( ) Four years' college, plus over one year specialized study on a full-time basis.

( ) A combination other than those stated above. This combination is:

APPROVED———— ORGANIZATION NO.———— TITLE————

Injection-molded polystyrene patterns are assembled into trees at this bench by joining them together into rows with cast-in-place push plugs, then joining rows with wax rods which form runners. Gate is an injection-molded plastic crucible. Plastic patterns are made to finished part dimensions, as shrinkage allowance is not necessary

CENTRIFUGAL PROCESS IMPROVES INVESTMENT CASTINGS

BY VINCENT S. LAZZARA, CASTING ENGINEERS CORPORATION

Plastic patterns replace wax. Many alloys cast to finished size; need no machining. No shrinkage allowances required

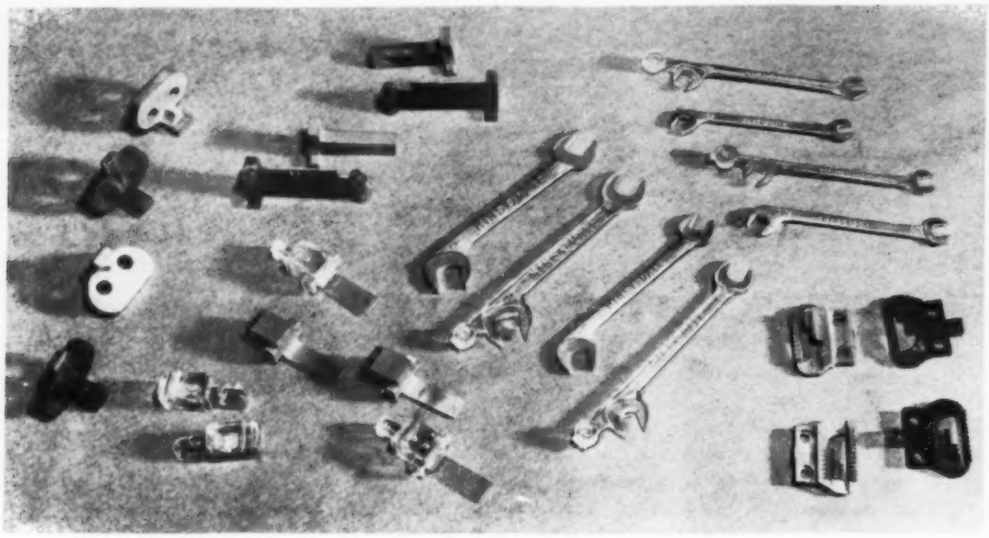
CENTRIFUGAL casting methods developed by Casting Engineers Corporation have made possible the production of small precision castings by the investment process with greater density and higher strength than have been possible with other investment-casting techniques. Small open-end wrenches made as centrifugal castings in investment molds do not require machining and outperform wrenches forged from the same steel alloy and machined to size.

Injection - molded polystyrene plastic patterns are used for making the investment molds. The individual patterns have mating plugs and tapered holes to permit their rapid assembly into "trees," so a number of parts can be cast at the same time. In some cases, wax rods form the runners in other cases injection-molded plastic runners are employed. In either case, plastic cups, or crucibles, form the main pouring gates.

This centrifugal-casting process eliminates shrinkage allowances in making patterns. The mold in which the plastic patterns are made is machined to the drawing dimensions of the part to be produced, and the patterns can be checked against these drawings. Master patterns are not necessary.

Centrifugal investment castings made to date by Casting Engineers Corporation indicate that most castings can be held within plus or minus 0.002 in. in sizes up to ¼ in. Where size is under ½ in., it is possible to hold tolerances to plus or minus 0.005 in. Unusual shapes sometimes require broader tolerances.

To date, we have made precision castings by the centrifugal process from mild steels (SAE 1020, 1040, 1090, 3140, and 4615), stainless steels (Types 302, 303, 304, 410,



Sample investment castings made by centrifugal process are shown beside their injection-molded patterns. Left to right are parts for a steel strapping tool and a stapler, four sizes of open-end wrenches, and a sewing machine part. Double-end wrenches are cast from alloy steel in trees of 100 to 160 wrenches, depending on size. Each of patterns shown is of push-plug design for rapid assembly into trees

416, 430 and 440), tool steels, high-speed steels, beryllium copper, brass, aluminum and manganese bronzes, and a number of aluminum alloys.

Investment molds are made by the same procedures as those of most investment casters. When pattern trees have been assembled and coated with a silica powder, they are mounted on flat steel plates with hot wax. Then the steel flask shell is placed over the tree and attached to the plate with wax. Silica investment material of proper consistency is ladled into the flask, and the flask is placed on a vibrating table for 60-75 min. to settle the material around the pattern. The hard-packed flasks then are removed from the vibrator to a nearby bench where they set overnight (12-16 hr.) before transfer to the burnout furnace.

Wax or plastic pattern material is burned out of the molds at 1400-1800 F., depending upon complexity of the patterns. Usually the molds must remain in the furnace for 4-6 hr.

The centrifugal casting machine consists of a 26-in. diam. table fitted with a mold cradle on one side and a counterweight on the other so the table can be operated at 150 to 580 rpm., depending upon type of metal to be poured and complexity of patterns. Vertical shaft under table is connected to the 2-hp. drive motor through interchangeable V-belt

Trees of patterns are coated with a silica mixture, then mounted on a steel plate with hot wax. When steel flask has been mounted on the plate with hot wax, wet investment material is ladled around pattern tree and filled flask is placed on a vibrating table. After 60-75 min. on vibrating table, the hard-packed flasks are placed aside to settle overnight before transfer to burnout furnace

Flasks ready for casting are placed in burnout furnace for 4-6 hr. at 1400-1800 F. to remove plastic pattern material. Flasks are removed from furnace one at a time as casting progresses.

Centrifugal casting machine has 26-in. dia. table with flask cradle on one side balancing counterweight on other side. In center is slidable table on which is rested crucible in which metal is melted. Flexible leads connect induction heating coil to 30-kw. Lepel high-frequency converter so same coil can be used alternately at two casting machines

sheaves, which are changed to provide the desired speeds.

Three sizes of ceramic crucibles, with capacities for 2, 6, and 10 lb. of metal respectively, melt and pour steel for castings. Graphite crucibles handle non-ferrous metals.

When ready for a casting operation, the crucible is mounted on a sliding plate in the center of the casting-machine table. The proper weight of metal is placed in the crucible and the induction heating coil is mounted around the crucible. When the metal has been melted, the hot mold is removed from the oven and placed in its cradle on the table of the machine. Slag, if any, is skimmed from the molten metal in the crucible and temperature is accurately checked with an optical pyrometer. Then the heating coil is removed, and the crucible is moved against the open end of the mold. This is done as quickly as possible so the molten metal will not have time to cool below the pouring point. With the crucible in position, a pushbutton is operated to start rotation of the table.

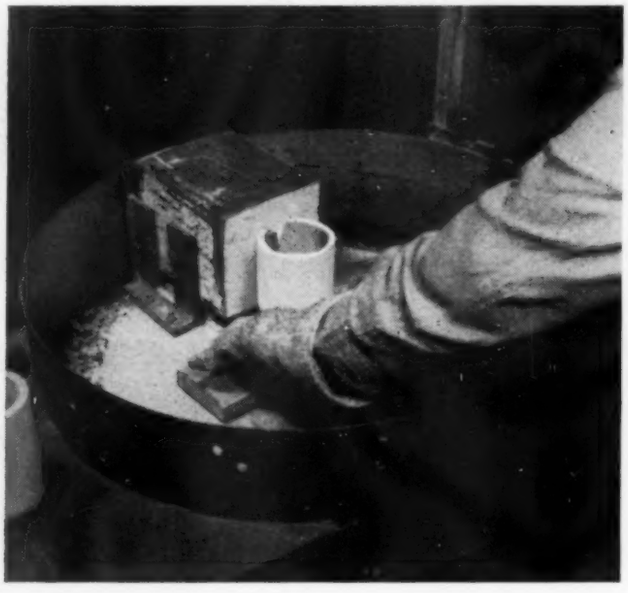
Because the side of the crucible in front of the gate opening in the

When metal in crucible has been melted, hot flask is removed from burnout oven and placed in cradle of casting machine. Induction converter is still operating to maintain temperature of melted metal. Side wall of crucible is slotted to height of gate in end of investment flask

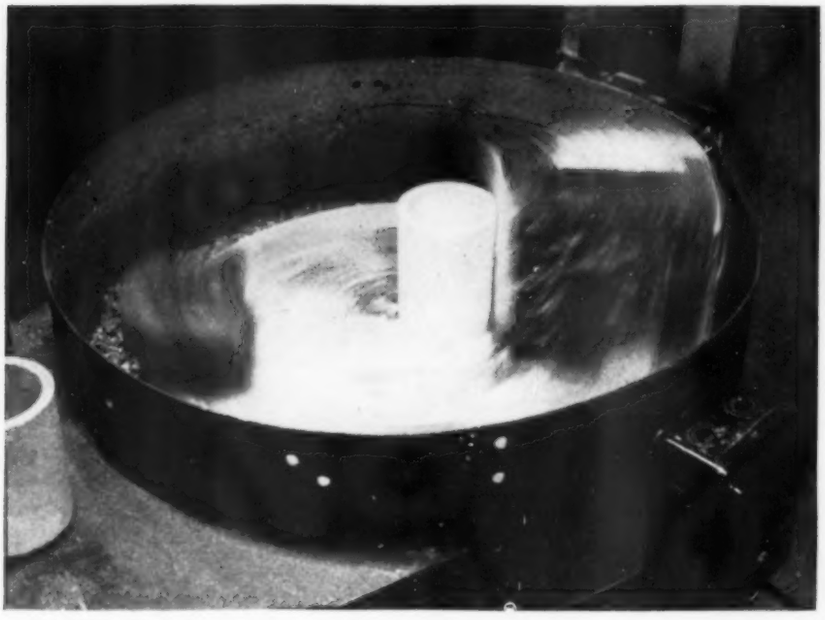
Prior to pouring, temperature of molten metal is checked accurately with optical pyrometer

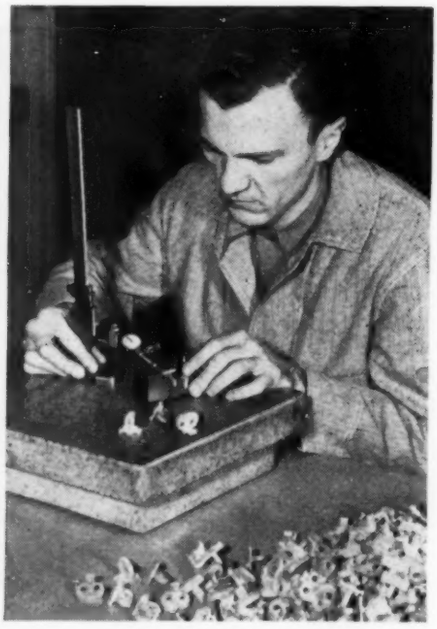
end of the mold is slotted, centrifugal force causes the molten metal in the now out-of-center crucible to rise along the wall of the crucible and flow through the slot into the gate of the mold. Rotation of the casting machine is continued for about one minute to insure transfer of all of the metal into the mold, and to permit the poured metal to cool sufficiently to solidify in the mold.

At the end of the casting cycle, the mold is removed from the table of the machine and set aside to cool. Later the casting is removed from the investment mold with an air hammer, and the cast tree is placed in a sandblast machine to remove any remaining investment material. Castings then are sawed from the tree with an abrasive disk or a friction bandsaw and delivered to an inspection bench for a 100% check for visual defects or dimensional errors.



Induction coil is removed from around crucible when temperature of molten metal has been checked with pyrometer. Coil is not disconnected from leads. With metal at proper temperature for casting, crucible is moved against end of investment flask so slot in sidewall is against gate opening. This operation is performed quickly so metal does not cool before rotation of casting machine can be started





Depending upon alloy being cast and complexity of casting, table of centrifugal casting machine is driven at 150 to 580 rpm. by 2-hp. motor. Rotation of table is continued for about one minute until molten metal solidifies in mold. When castings have been cut from trees with friction saw they are inspected for visual defects and dimensional accuracy. Centrifugal casting process makes it possible to hold close tolerances on most castings, like these parts for a steel strapping tool whose surfaces must be parallel or perpendicular within 0.003 in. total indicator reading

TALKING SHOP

Job Shop Idea

IF WORKING AREA is limited, and jobs are short-run, Jerome Reich of Reich-Huntington Iron Works has an idea that may be helpful. He has his benders, countersinking machine and the like on skids. When they're needed, he picks 'em up with a portable crane and places them on the spot. One motor may serve several machines—its base merely being staked to the floor so it can drive by V-belt. When the job is completed, the machine goes back into a corner out of the way.

Dynamic Color

TRENDS toward brighter colors in metalworking shops are unmistakable—shop after shop reports better morale, cleaner and safer working conditions, even improved output. But the biggest shop we've seen that adopted "color dynamics" is the C. & O. locomotive repair shop at Huntington, W. Va. Light-green columns, walls and machines, orange on moving parts, etc., is the scheme. Some repainting, done two years ago, is still bright; the rest was done last year. Shop executives report that men keep the shop cleaner, appear less fatigued. We can add that it's the lightest, brightest car shop, of any age, that we've ever seen.

No Relief

ACF's ALL-WELDED HOPPER CARS involve welding without subsequent stress-relief. The C.&O. chief inspector reports no evidence of failure from this source. Cars are better streamlined, eliminating the pockets in which corrosive coal dust can lie and assuring cleaner dumping. Cars are several thousand pounds lighter and are stronger. Jig construction makes cars more truly duplicates, thus reduces the repair cut-and-fit problem.

Light Storage

IF YOU'VE A "windowless" plant, better paint exits, stairways and fire equipment, etc., with a luminous paint. Then, if power fails, the chance of panic or real trouble is reduced. Incidentally, luminous paint is in effect a storage battery—for light rather than electricity.

Peanut Butter

THEY TELL US that a certain engineer began to look through his lunch bucket on his first day on a new job. He picked out Thermos, pie, apple, and finally a sandwich. When he opened it, his face twisted with displeasure, he snorted, "Peanut butter!" and threw the sandwich away. The same thing happened on succeeding days, until finally one of his associates ventured, "If you dislike peanut butter so intensely, why don't you tell your wife to make sandwiches of something else?"

"You leave my wife out of this!" snorted the engineer, "I pack my own lunch!"

Dry Heat

GENTLEMAN who started a small metallurgical laboratory in New York City could find only unheated quarters. Instead of an expensive heating installation, he bought an old gasfired hair dryer, complete with ducts and outlets. He thus has a gas-hot air blower system at a total cost of $75.

Tablecloths

LEGEND HAS IT that waiters in Keeler's Restaurant, Albany, N. Y., carefully and promptly clear the table of a certain machine-tool man who lunches there with key customers. The M.T.M. illustrates his sales talk with charts, diagrams and sketches on the tablecloth. The talk complete, he takes the tablecloth along as a record. Must mothproof his files.

New Trade

WHEN American Car & Foundry switched from riveted to welded hopper cars at Huntington, W. Va., many welders were needed and riveters would have been superfluous. To work out the problem, the company supplied welding equipment and instructors to the local trade school, suggested that riveters who wanted to learn an additional trade enroll. Some 167 riveters took the night course of 2 hr. per night, 2 nights a week for 6 weeks on their own time. The 140 who qualified were then brought into the plant and given 150 hr. additional training at minimum wage rates, then 50 hr. of advanced training at higher rates. These men went on the new line, and showed as much skill as the other welders, plus a knowledge of car building that helped establish the present pace of 17 min. per car. The result of the policy has been heightened morale and a competitive spirit far better than anything we've seen since the war.

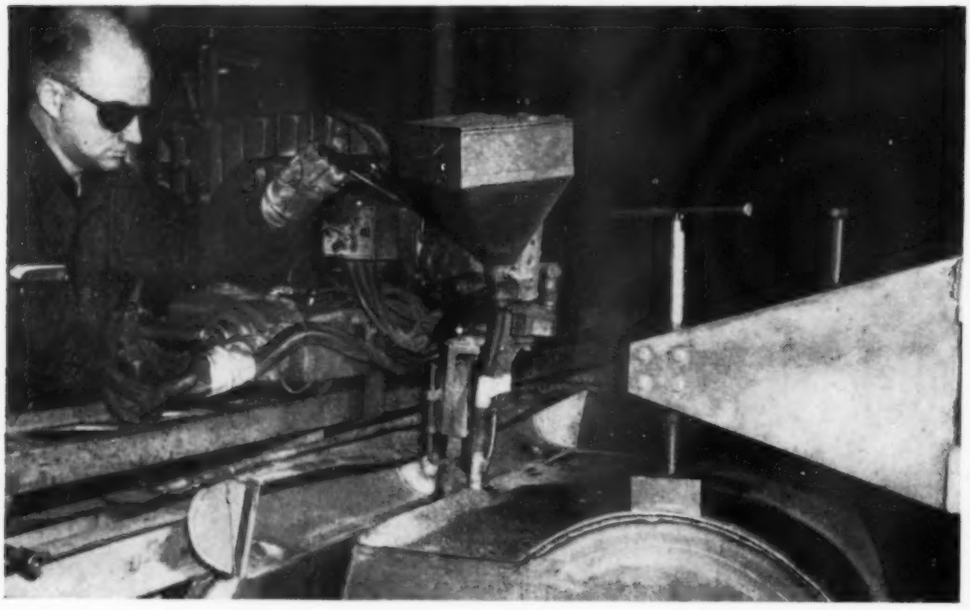
This "gang" spirit is maintained by a combination pay system, involving about 19 cents per hour base rate, plus 50.8 cents per car piecework. Jobs are balanced so each takes about 15 min. of the 17-min. cycle, as many as 15 welders working on one car at a time.

SHOP SHOTS

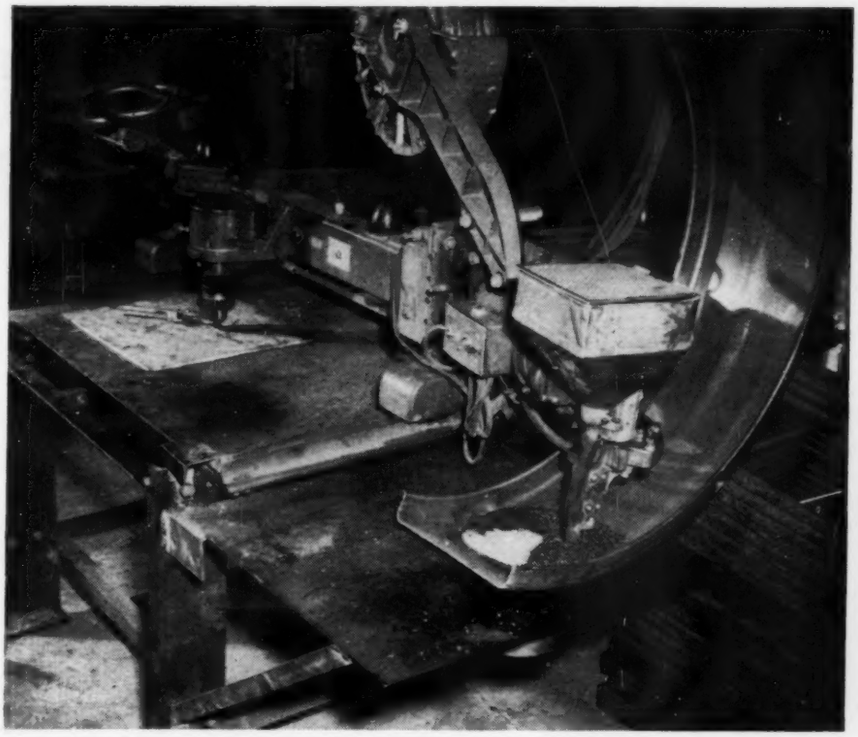
AT KALAMAZOO STOVE

First major step in assembling a Kalamazoo furnace is to tackweld the front frame to the furnace body. Prior to this, the oval-shaped body collar has been Unionmelt welded to the front extension plate, and the top and bottom tackwelded

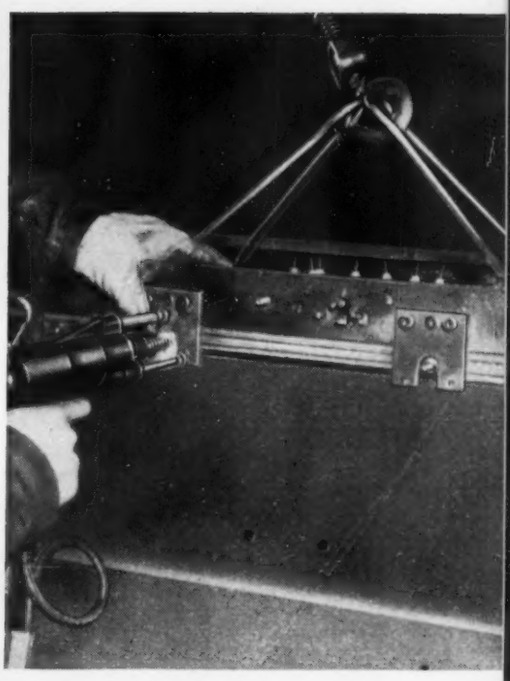
Power-operated rotating fixture moves the furnace assembly at welding speed while the top and bottom are automatically welded to the body. Welding proceeds simultaneously at each end and operator attention is required only for loading, and for starting and stopping the welding and positioning fixture



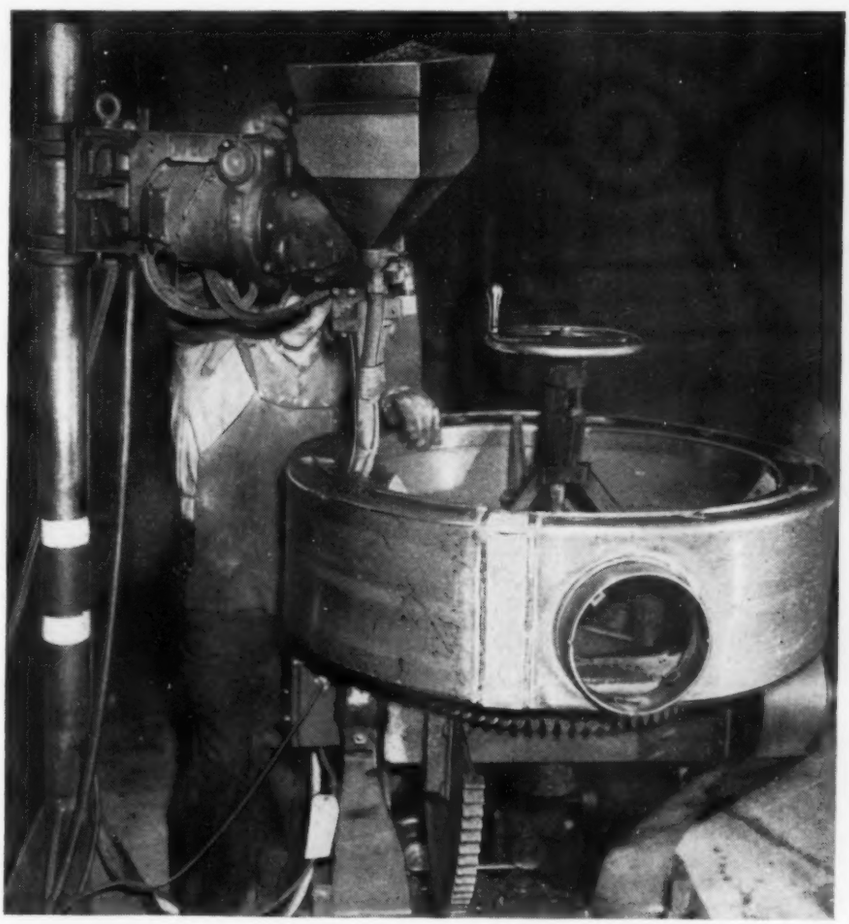
Special indexing fixture locates the furnace assembly while the front frame is Unionmelt welded to the side sheet on both sides and at the top. The welding head is spring-loaded to cause it to follow the curved shape required by the front frame contour



Smoke pipe is welded to the outer half of the radiator shell by using a special radius attachment to guide the welding head and to produce the necessary three-dimensional shape weld. The rod feed takes care of the vertical movement necessitated by the curvature of the shell

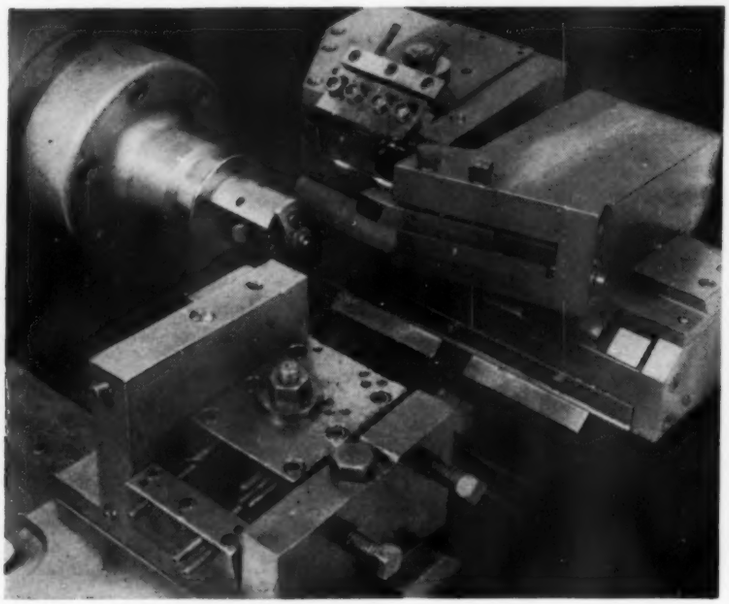


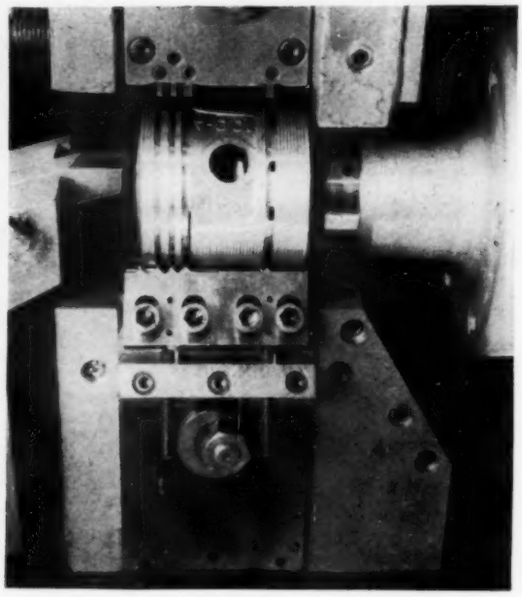
Automatic stud welder attaches a series of studs to the front frame. These secure the outside cover or jacket which encloses the furnace body. The operation is very fast and requires only a few seconds per stud



Circular radiator shell is assembled by welding the upper and lower edges. Welding time is 97 sec. for each 115-in. weld. Two positioners are used so welding can proceed on one part while the other is being loaded and made ready for use

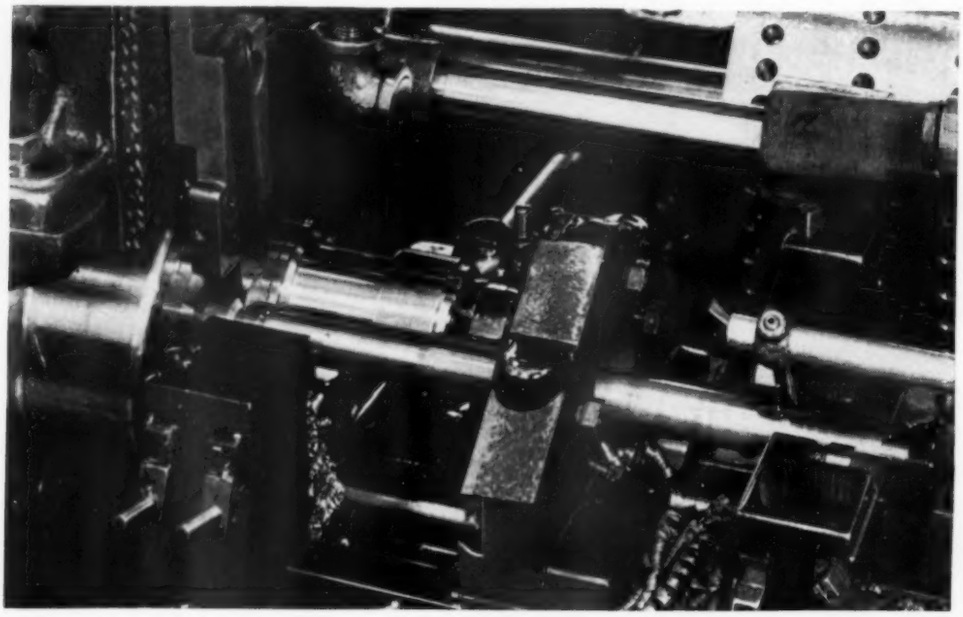
· TALENTED TOOLING

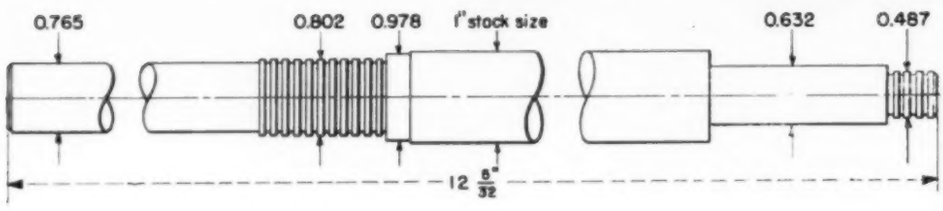




INVERTED TOOLS CUT AND GROOVE REPLACEMENT PISTONS

Auto-engine pistons with grooved O.D.'s, internally chucked in Sundstrand automatic lathe, are turned and faced completely in one operation. Grooved surface controls expansion, keeps piston cool. Inverted tools in rear finish 33 small grooves, 4 large ones. Second toolslide carries inverted facing tool. Form tools in front rough out the 4 large grooves before rear tools engage. *Novi Equipment Co., Detroit, Mich.*

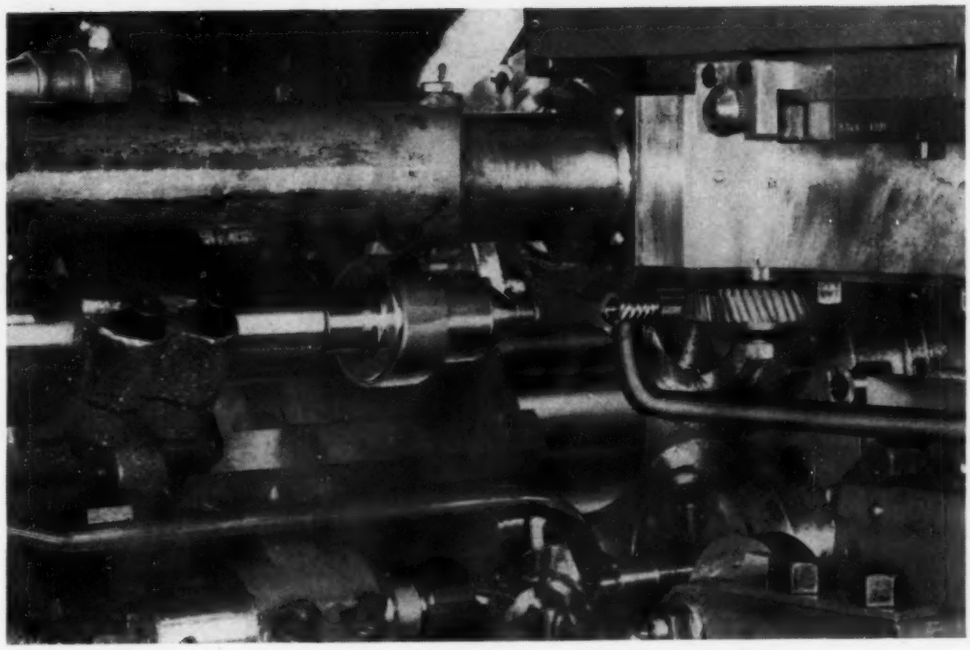


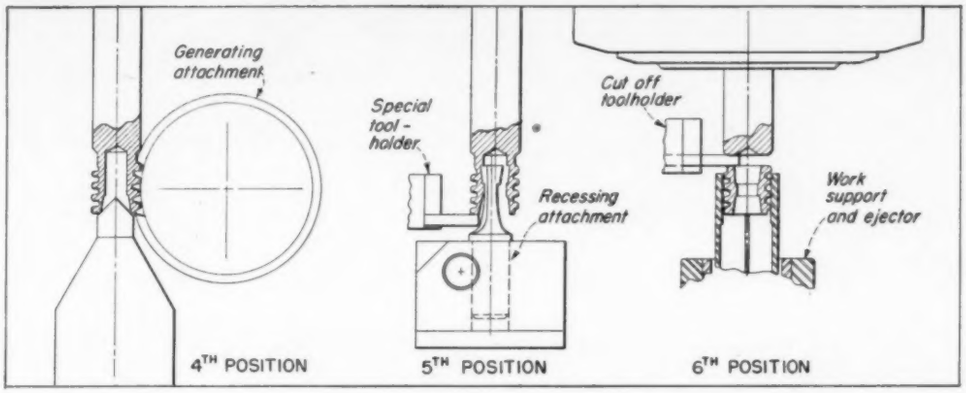


ROTOR SHAFT TURNED ON AUTOMATIC SCREW MACHINE

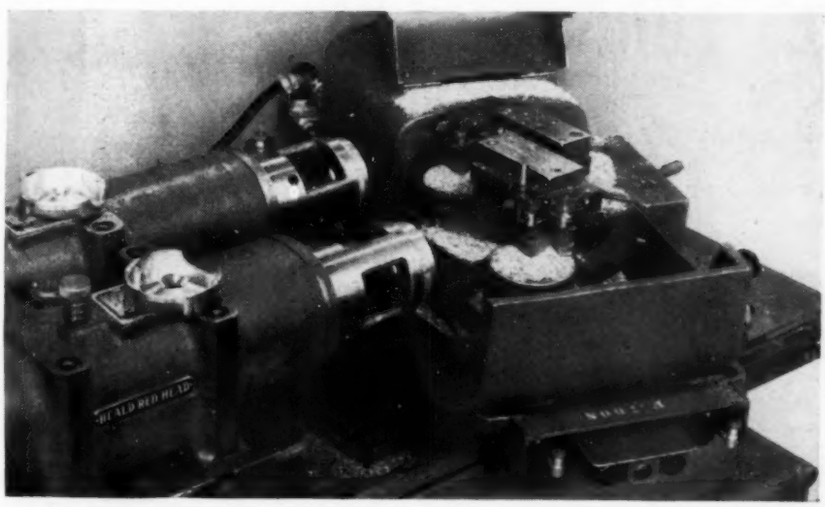
Fractional-horsepower rotor shaft is turned complete in one automatic screw machine operation. Three rollers at right steady the stock. Milling slide turns the 0.632-in. diameter and the others are turned by front slide. Rear slide makes long section of serrations and short section on next part, chamfers and undercuts. Stock size of 1 in. is left on center O.D. Cutoff is started by tool on rear slide and is finished by independent cutoff attachment at far left. *Cleveland Automatic Machine Co., Cleveland, O.*

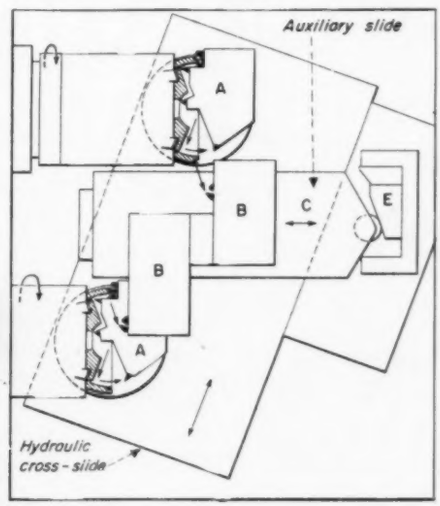
WORM GENERATION ADDED TO SCREW-MACHINE CYCLE





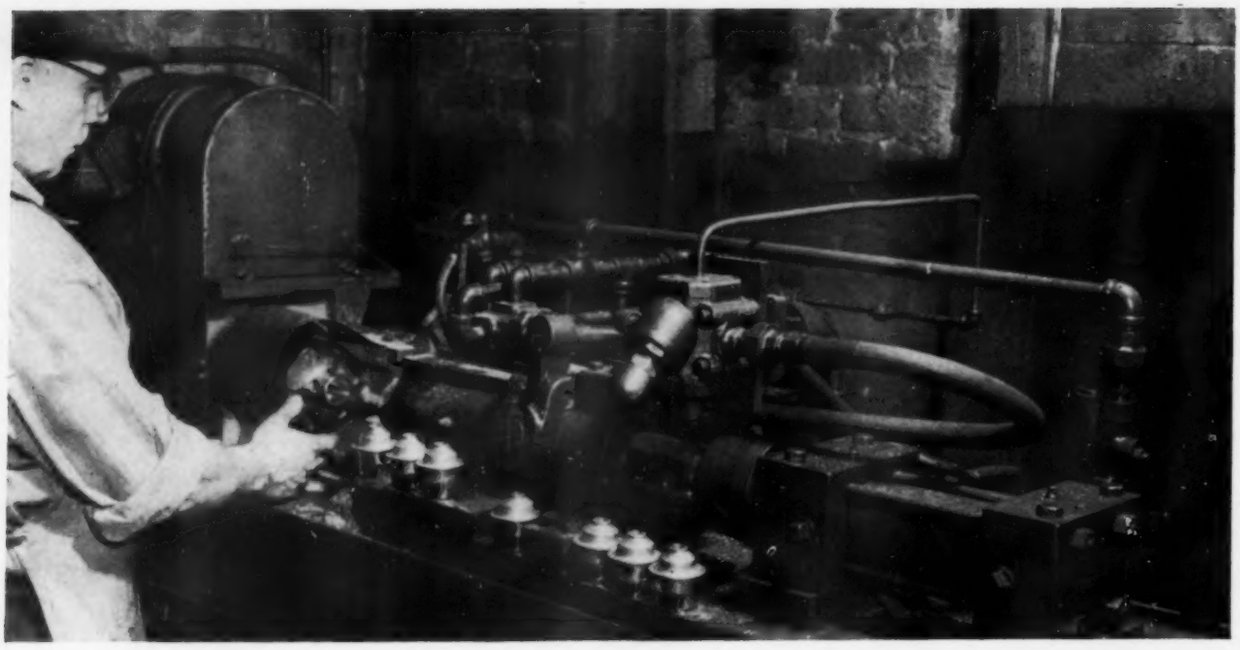
Hourglass worm (at end of coolant pipe) is generated at the fourth position in a six-spindle automatic screw machine. Thread is left-hand with four stub teeth. Worm has a 0.800-in. O.D. and a 20° pressure angle. Operations at first three positions are simple forming and drilling. Recessing and facing operations follow in the fifth position and cutoff is made in the sixth. A work support holds the worm during cutoff and ejects it from the Machine. *New Britain Machine Co., New Britain, Conn.*

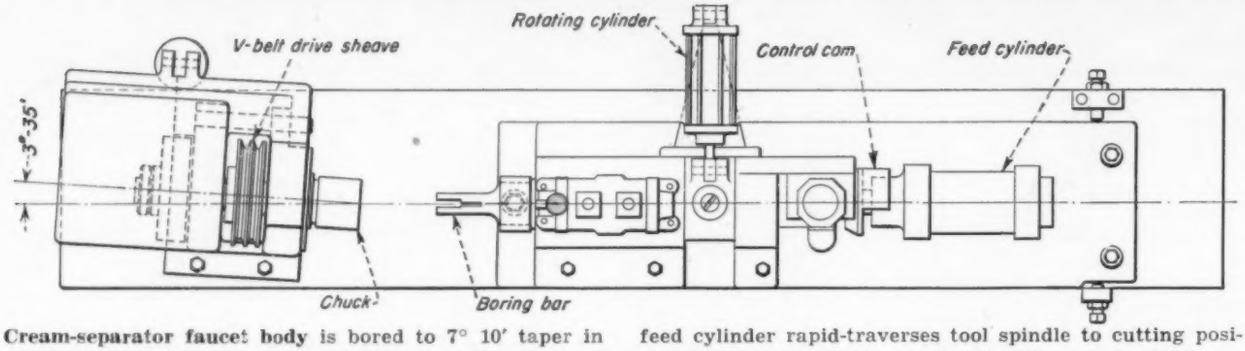




ROTATING TOOLBLOCK GENERATES SPHERICAL METER SEAT

Mating water-meter shells are chucked in air-operated collets for automatic cycle that faces grooves and generates spherical section to match wobble plate. Completed parts are on the Bore-Matic heads. Shell rabbets (right) are grooved by toolblocks *B* bridging over blocks *A*. Auxiliary slide *C* and cam *E* guide rabbet-facing action. Cross-slide travels at 20° angle to cut conical seats. Blocks *A* are rack-rotated. *The Heald Machine Co., Worcester, Mass.*



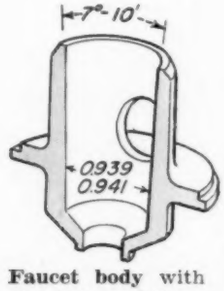


Cream-separator faucet body is bored to 7° 10' taper in special lathe. Headstock is mounted at half the taper angle to the tailstock so tool feeds straight in. Hydraulic feed cylinder rapid-traverses tool spindle to cutting position and swing cylinder rotates it to line up for boring. V-belted, 1-hp. motor starts with pushbutton control

SPECIAL LATHES TURN TAPERS

Hydraulic and air-operated units cut 7° 10' taper on plugs and bodies for cream-separator valves

By K. R. McKAY, General Superintendent, Richmond Works, Farm Implement Division, International Harvester Company



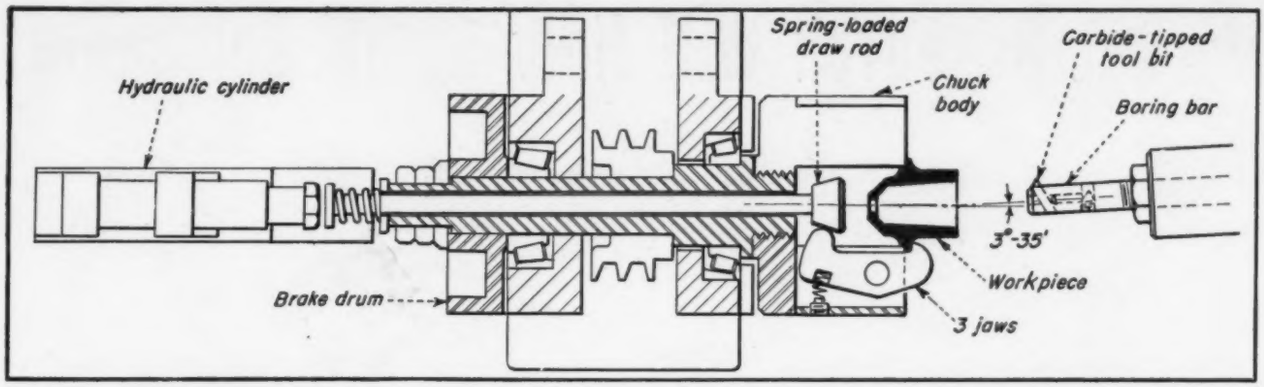
Faucet body with outlet hole and flange has internal taper

PLUGS and bodies for cream-separation faucets are machined with a 7° 10′ included-angle taper on two special lathes. Headstocks and tailstocks are out of alignment by 3° 35′, which produces the final taper. Both machines are handled by one operator.

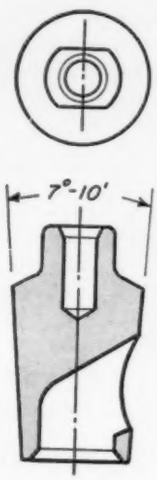
Hydraulic power for the boring lathe is furnished by a Vickers pump and storage tank mounted on a wall above the machine. Double-acting cylinders control the work cycle with three related motions: tool-spindle feed, tailstock swing (rotation), and headstock spindle brake. The three are controlled by a single hand lever on the tailstock. A fourth cylinder, installed after the machine was in production, releases the work from the special chuck. A spring-loaded drawbar is moved forward to free the jaws from the lip of the faucet body.

The turning lathe is powered by air pressure, furnished through shop lines and a storage tank. While the boring machine uses a trunnion-supported cylinder to swing the tool spindle the turning machine employs a rack and gear segment.

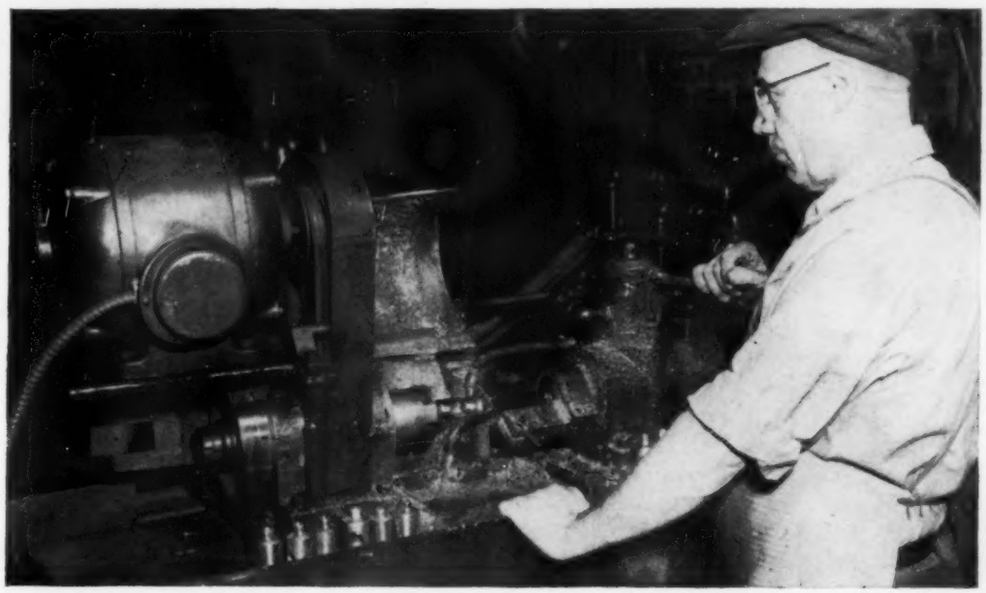
The brass castings are fully machined when they leave the taper-turning group and are then nickel-plated and polished for installation.



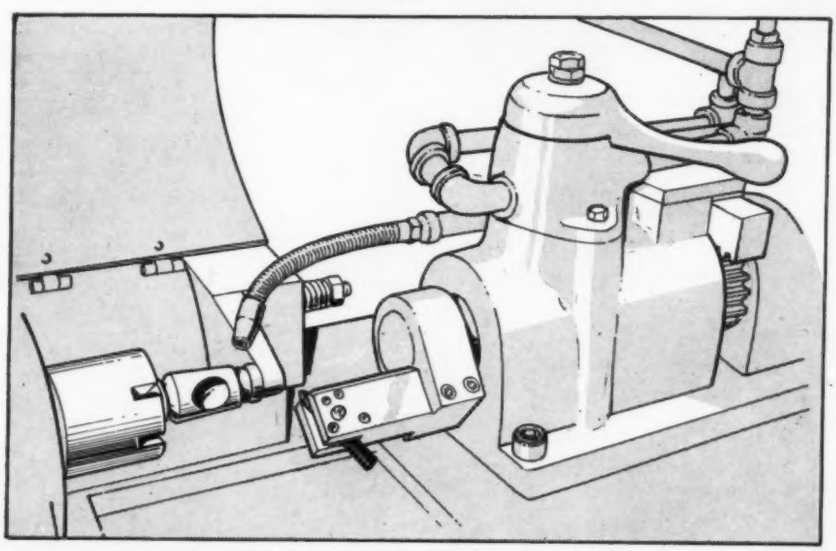
Three-jaw clamping chuck rotates brass body at 1300 rpm. Separate hydraulic cylinder at rear of headstock (left) controls chuck release for unloading finished parts. Loading and unloading are the only manual operations



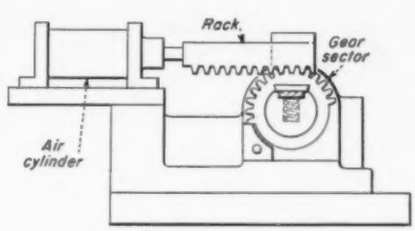
Faucet plug has external taper with curved hole to mate with body



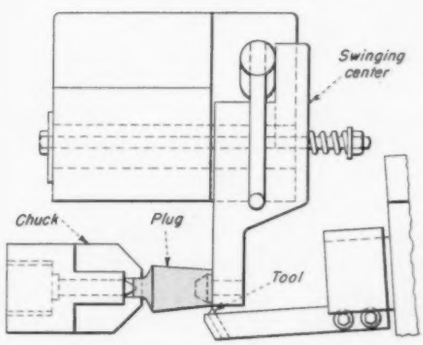
Cream-separator faucet plug is finish-tapered in water-cooled turning operation to same angle as body. Turning lathe uses air pressure to feed tool, swing tool spindle into position and to brake chuck spindle. Flats in chuck hole engage flats on work



Spring-loaded center fits into previously bored hole in plug for steadying. Tool spindle travels 2 in. rapid, 2 in. slow traverse by bleeder-valve action. Rack and gear sector on tailstock swing tool 45° into position to start cut and back after operation is complete. End teeth on gear hit a support block that acts as a stop. Air-storage tank overrides line variations



RACK AND ROTATING GEAR SECTOR



SPRING-LOADED SWINGING CENTER

Market Research Will Help Small Companies

Common-sense methods get the facts that eliminate guesswork from appraising market potential for long-range production planning

BY MURRAY G. JENKINS,
Staff Consultant, Frank C. Brown & Company, New York

ONE of the greatest pressures in our daily business lives is that of making decisions. To reach a sound business decision several things must be done:

1. **Analyze the nature of the problem**—discover why it exists what it means, and to what it relates.
2. **Ferret out all the facts,** interpret them, see which way they point.
3. **Weigh the effects of each possible solution**—or decision.
4. **Apply practical business experience to develop a decision** based on solid facts and the necessary judgment factors.

An excellent means for getting facts, analyzing them, and putting them to work is industrial market research.

In a broad sense, market research is the study of the distribution of goods and services from producer to final consumer. Actually, it's merely a common-sense analysis of the various factors affecting marketing activities. From the viewpoint of the producer the important thing is that this analysis can provide the factual information needed to make a good business decision—or at least an "educated guess."

In making an industrial market study there are no definite standard formulas that are applied. It is rather a matter of considering certain logical elements of marketing with an eye to discovering which market characteristics affect the sale and distribution of a given product the most. No attempt is made to measure these characteristics scientifically. Certainly market research is not the complicated device many businessmen suspect it is.

How It Works

To show how it works, we shall consider an example. Let us say that a man wishes to manufacture and market aluminum windows. Let's assume that he can produce these in large quantities; that they are as good as, or even better than, other similar products; and that he has sufficient financing to conduct an organized and adequate sales program.

There are several things he wants to know:

1. To whom shall I sell this product?
2. Where can I sell it?
3. How shall I sell it? Also what will it cost to get the products from the plant to the market?
4. What kind of and how much competition will I have?
5. How much should I charge for it?
6. How many can I expect to sell?
7. Do I have the best possible design, according to the wants of my potential customers?
8. What about maintenance and servicing?
9. How large a sales organization do I need?

These questions require answers based on solid facts.

The first step is to find out what potential market exists for aluminum windows—such as, new residential construction, new commercial construction, and replacement windows for old homes.

The next step is to ascertain aluminum-window acceptance in each of these fields. Acceptance would be based partly on customer and dealer knowledge of the salient features of the product, its usefulness, price, appearance, and any general preference for a new type of window of this nature. It's very useful, also, to know what the other fellow is doing, and how he is making out.

The third step is to decide upon channels of distribution. This product could be sold in any of three ways:

(a) Direct from the manufacturer to large-order customers, such as contractors.

(b) Through wholesale distributors strategically located near large potential markets.

(c) Direct to such retail outlets as building-material dealers, hardware stores, and appliance dealers.

Also to be decided at this time is the price to be charged and the establishment of an over-all pricing policy with respect to distributors, retailers, building contractors, and other buyers.

The fourth step is to segregate sections of the country into definite market areas based on logically defined sales territories, so no territory is so small it prevents each distributor from making a fair profit in his own area. Nor should these territories be so large that they could not be adequately covered by factory or distributor representatives. Another thought here is that of service and repair. Dealers must be located so they may be reached easily when the need arises.

The fifth step is to estimate the potential sales volume and profit and to make a sales forecast in order to:

(a) Control inventories

(b) Plan production schedules

(c) Stabilize employment
(d) Set sales quotas
(e) Plan financial requirements
(f) Determine a pricing policy
(g) Control selling efforts

Much of the information could be obtained through combining a field survey to ascertain first-hand information with an analysis of various government and industry statistical data to utilize such pertinent facts as are already available. Careful evaluation of the material thus rendered could provide positive answers to the questions outlined.

Naturally, there are other factors to be considered, other steps to be taken, but the ones mentioned will give at least a rough idea of how market research works.

What It Does

Although the technique is utilized to obtain facts for many purposes, most studies are for:

(a) Interpreting market trends and general economic conditions.

(b) Estimating potential sales volume and profits.

(c) Developing new products, eliminating unprofitable items.

(d) Estimating the demand for new products, finding new uses for old products, improving present products.

(e) Establishing sales territories, sales quotas, and sales budgets.

(f) Forecasting sales by products and by customers for various territories.

(g) Examining the marketing activities of competitors both inside and outside the industry—measuring potential competition.

(h) Formulating general sales and distribution policies.

(i) Formulating sales promotion and advertising policies.

(j) Analyzing:
Distribution costs
Price structures
Credit and discount policies
Dealer and public relations
Distributor and dealer performance
Over-all sales policies, programs, and objectives
Sales costs
Performance of the sales organization
Warehouse and transportation facilities and costs.

Who Collects Data?

How to obtain the data? This depends somewhat on the type of information you need. If, for instance, only general statistical data showing business or industry trends and material for making mathematical forecasts are needed, it is often possible to obtain them from various government agencies, trade associations, and institutional sources. This information can be analyzed by men in your own organization — your accountant and yourself, for example. However, if you need first-hand information concerning market characteristics and other data pertinent to your marketing operations, there are two general ways to go about it:

1. Use your own salesmen or other personnel to go out and study the situation in person; boil down the data they get, and analyze the various factors yourself, or
2. Employ an outside firm, men trained in this work, to undertake the job, analyze the data, and give you their recommendations as to how to proceed from there. A good consulting firm will even translate their findings into action for you, if you wish.

Why Market Research Is Done

Market research, then, can be regarded as a management tool for obtaining certain facts necessary to sound business decisions. Whether a company is large or small, it habitually uses this tool to some extent. Large companies often have their own market research departments. These perform continuing studies and surveys and provide facts and advise in interrelated operations. Such departments consist of anywhere from one to 25 people, and they occasionally use outside market research consultants to augment their staff in performing specific assignments. Costs are usually budgeted against product sales. A rule of thumb for measuring these costs is to appropriate approximately one per cent of net sales for this work.

These large companies need a market research department in continual operation because of the size and multiplicity of their marketing operations. Much depends on having accurate data with which to keep abreast of competition and market conditions.

Medium and small businesses also need this kind of information badly. It is just as vital for them to have solid facts and figures as it is for the big outfits. No man, whether he heads a large company or a small one, can expect to make an 80 or 90% correct decision unless he is sure of his facts. Consequently, the smaller companies are spending more and more time in analyzing their marketing operations and studying market conditions.

One Man Can Do It

However, the collection and analysis of data is not often formalized under the term market research. It is usually characterized by informal analysis under the direction of one man, such as the sales manager, executive vice president, or the president himself. These men at times find it difficult to devote the necessary time to performing adequate and continuing research, and yet it must be done. Only by having complete market research data at his fingertips can the head of a small organization hope to continually improve the position of his company in its industry.

Some of the best men piloting smaller manufacturing concerns have been too close to the problems of one company for too many years. Frequently brilliant in their own organizations, they will say, "My business is different. I've been with it for a long time. I know my markets, my customers, the problems of my industry. I know the business inside out. Why should I use market research now?"

This may be a reasonable attitude, but we know that time and markets change rapidly, that new competition can develop overnight, that business and commercial trends fluctuate considerably, and that raw material shortages, for example, can throw the entire

production and sales picture out of gear. To capitalize on the resources at his disposal, the small manufacturer *must find out in advance* all the conditions and factors which will affect his business. If he does not, he will find that decisions are made partly on past performance, partly on intuition, and partly through guesswork.

Checklist of Market Status

What can market research do for small business? Is it really necessary? I shall say "yes" and then ask you to consider some counter questions:

1. What shifts in population, production facilities, consumer income and its distribution have occurred in the last two or three years that might affect your business?

2. What new uses have been developed for your products? What new industries do you sell?

3. What new products were developed during the war which can now be redeveloped or redesigned and marketed?

4. What changes in buying habits, both industrial and consumer, have occurred in recent years with respect to your markets and products?

5. Has the volume or type of demand for your products changed materially?

6. If so, do these changed demands and changed buying habits necessitate a new method for the distribution of your products? New selling methods?

7. How many potential customers for your products are there in the country?

8. Do you know where they all are and approximately what volume of your products they will buy?

9. Do you know the type of products they want most?

10. Are you sure that you are using the best methods of selling and distributing your products in today's market?

11. Can you estimate what your market will be in two, five, or ten years from now?

12. Do you know what your competitors are doing now, and what plans they have for the future?

13. Where do you stand in your industry? Are you getting your share of the available business?

14. Can you estimate the raw material supply situation for the months and years to come?

15. Have you examined the possibility of secondary markets for your products?

16. Have you considered all the effects of seasonal sales variations on production, labor supply, financing, and materials purchasing?

17. In your field, are you aware of and have you studied the many business factors affecting the operations of your present and potential customers?

If you know the answer to each of these questions, you probably know well where you stand. However, if there are still doubts in your mind, you have need of market research to provide the answers.

The point is this: in planning ahead in your business, get all the facts you can, get them early, stir in a large amount of common sense, *then* make your decision.

Adapted from an address to the New England District, Pressed Metal Institute, Worcester, Mass.

Tips FOR TOP SHOP MEN

249 Shops, as well as people, can get stiff in the joints. Machines, materials-handling units, tooling and personnel can be chosen to suit a present job—and have no flexibility when production rate moves up or down or specs change. Always keep tomorrow's potential in mind as you plan for today.

250 Do you call a conference—then expect the other conferees simply to listen to you? If you want to stage a monologue, perform before the mirror in the washroom; but if you want the help from conferees, let them talk too. And when you talk, *say* something.

251 Watch for the malingerer. Some people enjoy sympathy as a cat does petting, hence develop one petty ailment after another. They're very shocked when told it's another form of absenteeism.

"Gee—you finished the darn thing exactly according to specifications—I was hoping you'd make some lucky mistake that'd make it work—"

ROUND TABLE

Gambling on the Long Green

"Say, Al," fumed Ed, "One of my men's gone nuts!"

"Nuts? Who's nuts now?"

"Reynolds!" replied Ed. "Honest to Pete, I never heard of such a thing in my whole life. He came to me this morning and said he would be through at the end of the week; said he'd a proposition by a new outfit that was just starting out on a new gadget."

"And what was the proposition?"

"Well, he put it this way, Al: He said that he was told that he would be started out at a small wage—fifteen cents an hour below what he's making around here—and when things get going that the difference in pay would be made up to him plus an interest in the firm."

"It looks like a gambling proposition for Reynolds. However, Ed, that's his affair and I don't suppose we can do anything to stop him from carrying out his tools."

"No, Al, I've tried to induce him to stay but the man seems so hipped about the offer that nothing I can say would induce him to stay."

"The chap is young and I suppose he has a little put away to tide him over."

"He's taking an awful chance, Al, to give up a sure thing for a probable flop."

"Come to think of it, Ed; why shouldn't a workman be willing to take a chance just like the manufacturer does? Reynolds may be riding around in a Rolls if it turns out as he hopes."

"And I'll bet my suspenders that he'll be back after his old job if it doesn't."

"The fellow's taking that chance—it shows that he has the pioneering spirit if he has looked into the matter pretty carefully."

"But, Al, here the fellow was earning good money and now he walks into something that'll—well, Man, you know how many of these crackpot propositions go to the wall!"

"Sure I know—and you do too. Didn't we sink about five thousand bucks in that patented lemon squeezer that we thought was going to revolutionize the lemonade industry? We thought it was a sure thing. Maybe you didn't, but I used to lay awake nights planning my country home and wondering what kind of a yacht I'd get."

"But here the guy was making good money as he was; now he's chump enough to sacrifice quite a few rocks because he thinks he's going to get in the upper brackets overnight."

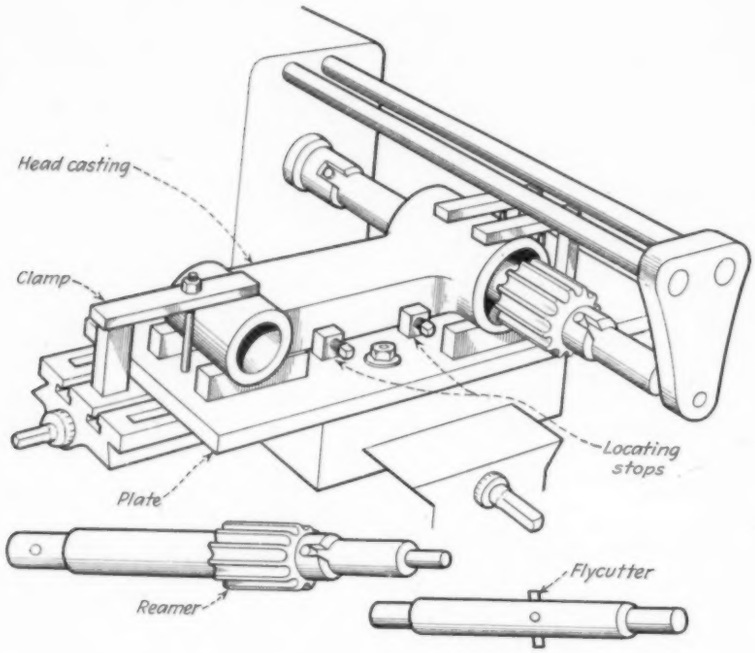
"Let's not be too hasty, Ed; there's something more than the mere financial return when an individual steps out into the future—it may be the saving grace to snap the fellow out of a life of industrial apathy. We do get that way now and then, Old Boy."

"Industrial apathy, my grandmother; it's like buying stocks in an oil well and most of the time all you get is salt water."

"It's the salt of intrepid ventures that bring in the returns eventually—not necessarily in cash either. Employers invest their capital in ventures not necessarily gilt edged; why shouldn't labor take the same chance?"

IS REYNOLDS SENSIBLE OR FOOLISH *in chancing earnings and future on "a new gadget"? Is youth the time for taking chances, and should management allow for this? What should an executive's advice be in such a situation—for the man, or for the company? Your comments are invited. Discussions of earlier topics appear on later pages.*

Practical Ideas

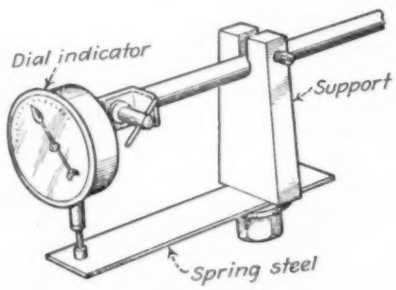


Drillpress Heads Bored in Miller With Fly Cutter and Shell Reamer

Drillpress heads were bored and reamed on a milling machine where a boring machine was not available.

A large plate was bolted to the milling-machine table to provide a working surface that could be drilled at any point for the setup. The heads were clamped down on this plate with standard clamping on top of parallel bars. The first cuts in the castings were made with a fly cutter that was mounted on an arbor in the machine. Reaming was done with shell reamers similarly mounted.

Drive for the job was through a sleeve and pin joint at the milling head, and the arbors were supported at the end of the cross arm. The sleeve and pin joint allowed rapid changing of the cutting tool, which was necessary on each individual hole being bored. Feed through the holes was controlled by the table infeed, and spacing between holes was handled by the traversing feed of the table. *Grover C. Russell, Needham, Mass.*

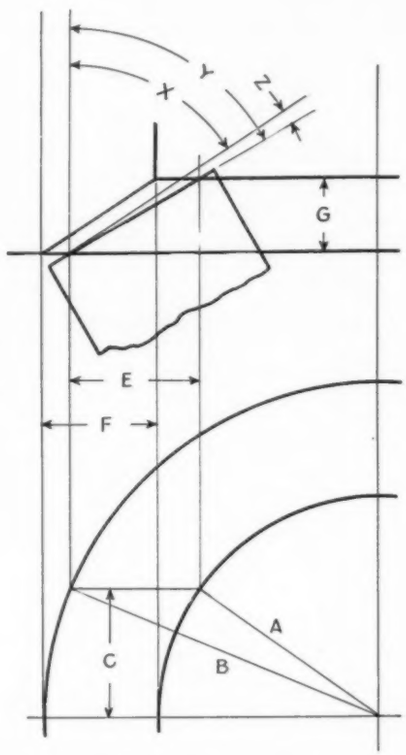


Accuracy in Indicating Shaft Improved with Thin Steel Leaf

In the process of checking the concentricity of a supposedly round shaft, a dial indicator will not always read the full error. This seems to be due to the friction drag set up along the indicator spindle caused by the friction torque of the rotating shaft.

If a leaf or pivoting arm is interposed between the spindle and the work, this effect will be overcome. A piece of spring steel can be attached, as in the illustration, to the shaft holding the indicator.

With a thin leaf in place to minimize the deadening of the indicator's sensitivity, the leaf will absorb all side thrust and reduce friction in the spindle. *H. Yarrow, Chelmsford, Essex, England.*



Offset Angle for Chamfering Is Found with Trigonometry

Tool designers and toolmakers may be assisted in their work by this method of angle correction for chamfering above or below the center of stock.

The construction illustrated

shows how the correcting angle is found. C is the height change, A is the short radius of the chamfer and B is the long radius. F is the width of cut on the centerline and E is the width in the new location.

$$E = \sqrt{B^2 - C^2} - \sqrt{A^2 - C^2}$$

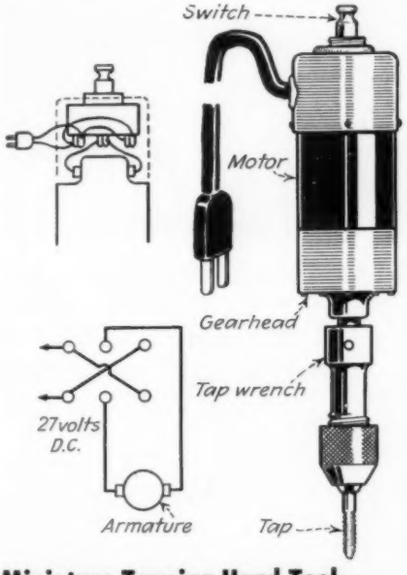
$$F = B - A$$

$$G = \frac{F}{\text{Tan } X}$$

$$\text{Tan } Y = \frac{F}{G}$$

Then angle Z = angle Y less angle X. This correction angle can be applied in a number of ways to the chamfering setup—to the toolbit setting, to the angle ground on the bit, etc.

Setting the toolbit above or below the centerline of the work is often done to improve the finish of the product. When this correction is made, the final angle Y will be greater by angle Z than angle X for an inside chamfer. For an outside chamfer Z is subtracted from Y to produce a smaller X. *Joseph J. Hanus, Chicago, Ill.*



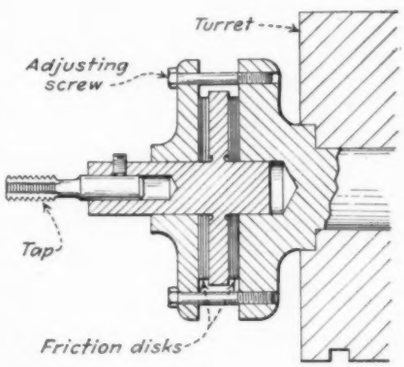
Miniature Tapping Hand Tool Made from Aircraft Actuator

This miniature tapper is the handiest tool in our shop. It is driven by a 27-volt permanent-magnet aircraft actuator, which provides about 1 in.-lb. of torque at 120 rpm.

The power supply would be a major stumbling block for shops that wanted to duplicate the machine, but in our case we already had available an auto transformer and a selenium rectifier combination that put out the required voltage of direct current.

The torque is adequate for tapping brass holes up to about number 8 size, and will handle steel up to number 6. It is perfect for the many 0-80 and 2-56 holes we tap.

At first we only had a brass bushing and setscrew combination to hold taps, but this has recently been changed to a standard tap-wrench held in place by a pin. A push-pull, double-pole, double-throw switch has also been added to allow reversing the tap with hand pressure at the end of the machine. *Donald P. Campbell, Cincinnati, O.*

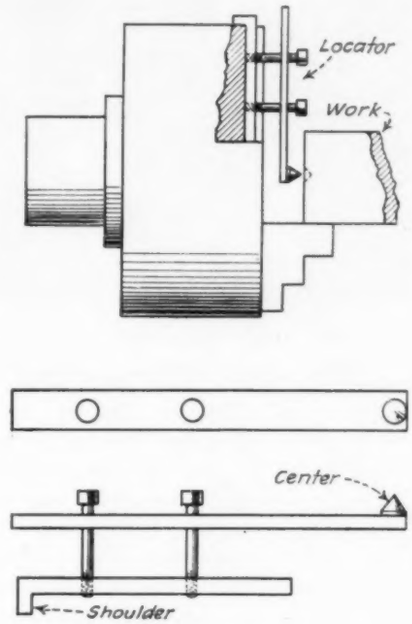


Tapping Clutch Prevents Jams

The main fault of conventional types of tap holders is that they do not take into consideration such variables as motor speed, faulty castings and non-homogeneous metal, and variations in the drilled holes.

This difficulty can be overcome by a friction holder that depends upon a non-metallic bearing material for driving linkage. Two cast and drilled plates clamp around a friction disk that holds the tap. Two washers are located between the plates and the disk. When the tap is held back by a fault in the material these washers slip the disk and prevent jamming and breaking the tap.

Some adjustment of the six bolts may be necessary to make the tension between the plates right for safe operation. Once properly adjusted, the clutch works well for high-speed operation. *Richard E. Mills, Isle of Wight*

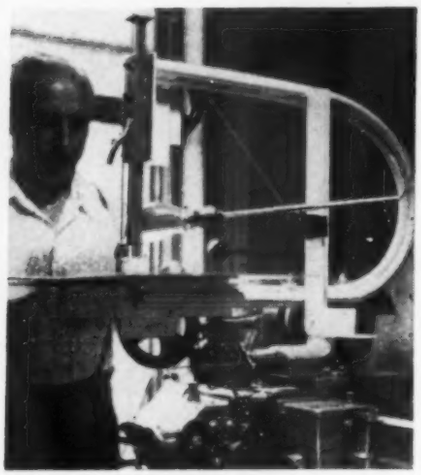


Chuck Device Set in T-Slot Locates Centerpunched Stock

It is difficulut to align round stock so a centerpunch mark in its end is exactly coincident with the centerline of a lathe spindle. When such a piece is chucked the mark is practically out of sight. This problem can be solved if a device is made for locating the mark in relation to the face of the chuck.

A shouldered bar is machined and drilled to assemble with a second bar that carries a center. The shouldered bar is shaped to fit into the T-slot left when one of the jaws of an independent chuck is removed. After the device is set in place, the stock is set on the three remaining jaws and pushed against the center. As the jaws are adjusted, the stock can be located so the center slips into the punched mark.

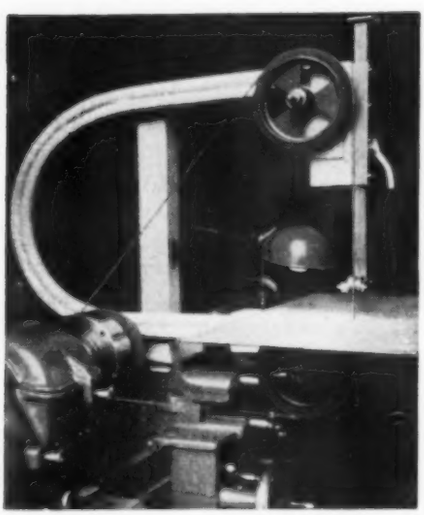
The holes in both bars must be located to give the exact distance from shoulder to center that will center the work. In case the chuck itself is off-center, as is often the case, the device can be set for only one of the T-slots which can be marked for reference. *H. Moore, Leeds, England.*



Pipe and Angle-Iron Bandsaw Driven from Engine-Lathe Head

Because our shop is crowded we have made a bandsaw for cutting sheet metal that can be attached to an engine lathe. When lathe operations are required, the saw can be removed and hung on a wall.

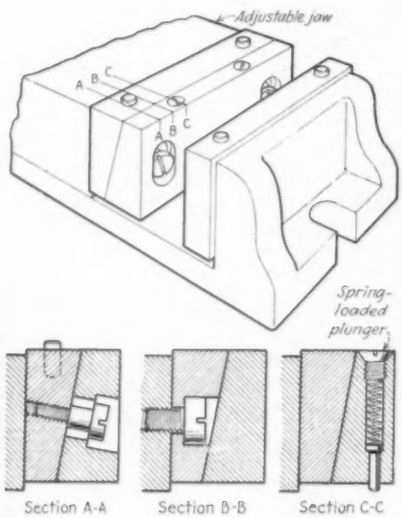
The frame is welded angle-iron and ½-in. pipe sections and the table is a flat piece of steel. Three 7-in. dia. pulleys support the continuous blade on ½-in. layers of soft rubber around the pulley circumferences.



A large variety of speeds is inherited from the lathe through the head-powered drive pulley. Since the saw is bolted to the lathe compound with bolts through the angle-iron supports, adjustment of blade tension can be made by moving the compound in and out. Perfect alignment of the three pulleys with each other is handled by adjusting the carriage on the ways.

The saw cuts a circle of 26-in. dia. and can take work up to the capacity of the gap between the roller and table—six inches. A roller bearing, fitted with two tool-steel bushings confines the blade between the two idling pulleys mounted on the frame. The pin through the bearing is turned down outside the roller to allow eccentric motion of the roller to compensate for different blade thicknesses.

The blade joint imbeds in the soft rubber on each pulley as it bends around the short-radius arcs when in motion. This has prevented any breakage of blade because of a short-radius bend. *Alois Steiner, Chimney Umbrella Co., Hoboken, N. J.*



Auxiliary Slanted Vise Jaw Holds Casting with Draft

Castings with a slight draft tend to ride up in a vise when they are clamped. This effect can be overcome with a vise jaw that is built in two sections with the mating faces slanted down and away from the work.

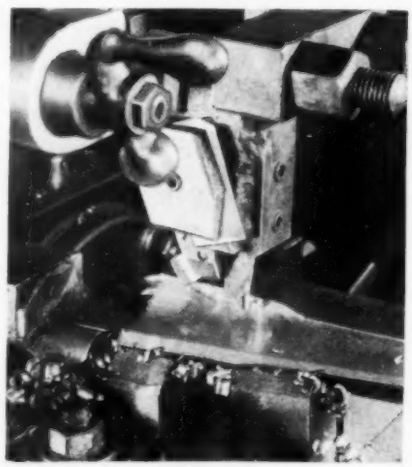
The moving member of the jaw is supported off the bottom of the vise by two spring-loaded plungers. Two vertical slots restrain vertical motion of the jaw as two bolts through them position the jaw against its fixed mate.

Locating pins were driven in holes in the top of the fixed jaws to align castings to be milled off flat. *L. A. Springle, Salisbury, England.*

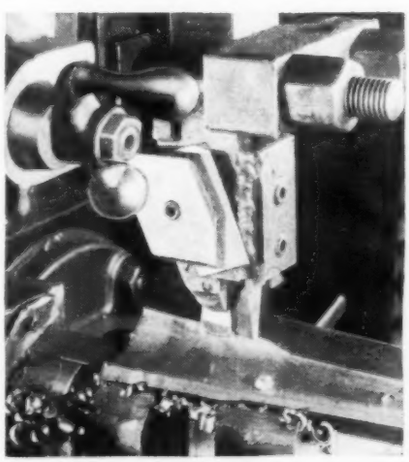
Latch Raises Profiling Tool For Clearance on Planer Job

Where planing is being done on jobs of unusual surface contour, the planer-tool edge is often apt to chip out on the return stroke of the work. This happened frequently on a steam-turbine-blade job that was done on a profiling planer.

To remedy the situation a simple tool-bar attachment was mounted to ride on the work during the return stroke and to lift the clapper box enough to clear the tool. The latch is pivoted to a metal bar behind the tool where it catches on the work at the start of the return



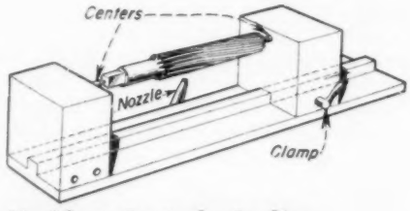
Forward stroke lifts latch behind tool to clear it from work surface



Return stroke catches latch and forces it down to pivot clapper box

stroke and forces the tool up. At the start of the forward stroke the tool digs into the work in the normal way and the latch is pushed back and up out of the way.

Riding on the unfinished part of th eturbine blade during the back stroke, the latch does not harm the finished work. The mechanism was attached to a three-ft. planer that was guided from a finished profile by a hydraulic follower. *John Brown, Allis Chalmers Mfg. Co., West Allis, Wisc.*



Air Blast Controls Cooling, Aids Cutter Run-Out Check

The problem of run-out in reamers and long milling cutters after they have been hardened can be effectively solved by setting up the tool between bench centers directly after it comes out of the furnace. An air nozzle, set under the centers, directs a blast at the flutes of the tool, causing it both to cool evenly and rotate rapidly. The even cooling effect is an advantage when the cutter is intricately designed.

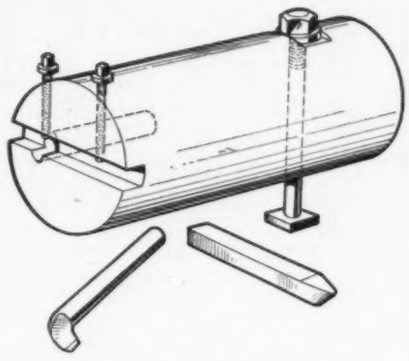
Run-out is corrected by a few light taps on the tool as it rotates. Although some experience is necessary to do a good job this way, correcting run-out by eye is fast and quite satisfactory. *William Braun, Wheeling, W. Va.*

Stubby Boring-Tool Holder Backs Up Heavy Cuts Rigidly

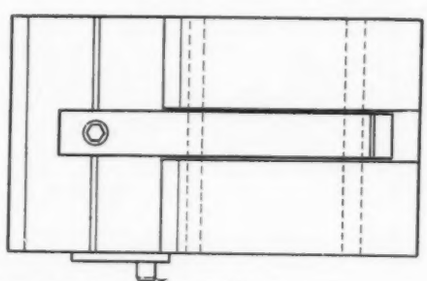
A combination boring-tool holder can be made from a piece of 3½-in. cold-rolled round stock to handle shallow boring jobs of all kinds. It is mounted directly on the lathe cross-slide, nesting in the T-slot and clamped by a T-head bolt.

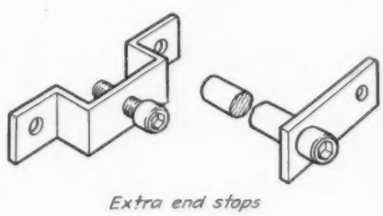
A vertical hole is drilled in the shank to admit the T-bolt and a horizontal hole is drilled in the front face to hold round-shanked tools for boring small holes. A horizontal slot is milled or shaped in the front end to carry a heavy boring tool for larger holes. The tools are held in place by one or two of the vertical bolts, one of which is drilled to intersect the round hole for the smaller boring tool.

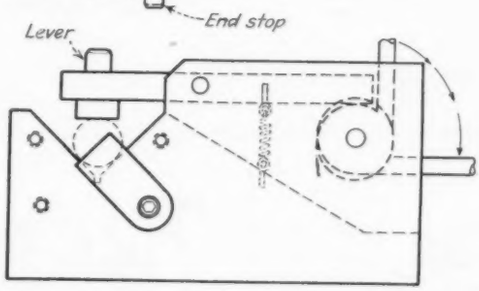
Since the shank fits on top of the cross-slide T-slot, pivoting is impossible, even when a light tightening pressure is exerted. The stubbiness of the holder adds rigidness to the arrangement, and cuts

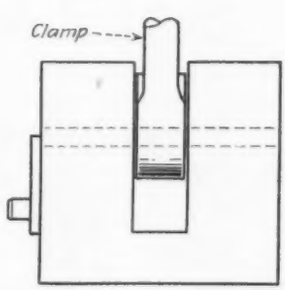


can be made to close tolerances. This feature also increases the capacity or bite the tool can take. *Frederick C. Lurz, Pelham, N. Y.*









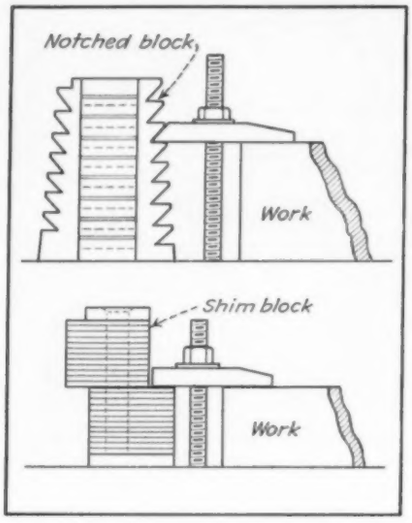
Cam-Clamping V-Block Fixture Holds Bar Stock for Machining

Originally designed for holding round stock for cutoff with a rubber-bonded wheel, this V-block can be hand clamped rapidly with the eccentrically-mounted cam. It can be adjusted to hold a large variety of sizes and shapes of work, but is most effective with round stock.

A large slot in the top of the block, perpendicular to the V, makes room for the cam and handle that is pinned to the block's sides. The holding lever is pivoted at a pin through the block and is held off the work when unclamped by a tension spring.

Action of the cam forces the back end of the lever up and the clamping pad down. Several holding blocks can be made to attach to the lever for clamping different work. Two extra end stops, upper right in the illustration, were added to hold work in positions other than flush with the block's side.

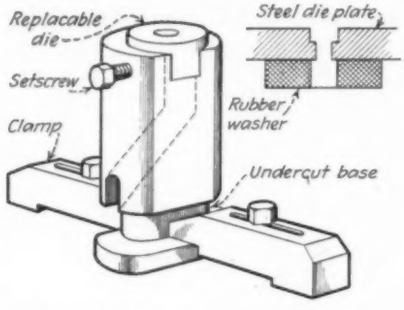
Light milling, drilling and cutting operations can be secured in the fixture. Its advantage is that only hand pressure is required for clamping—increasing speed and efficiency, especially with small workpieces. *Allan B. Nixon, Springfield, Mass.*



Two Shim Blocks Ease Clamping

One-piece step blocks are preferable to loose shims, which are easily lost or misplaced. The upper part of the illustration shows a single block that has been shaped to provide staggered edges for blocking up a clamp. The steps run around the block, on four sides, in increments of ⅛ in. This provides a practically unlimited height choice for clamp-down work.

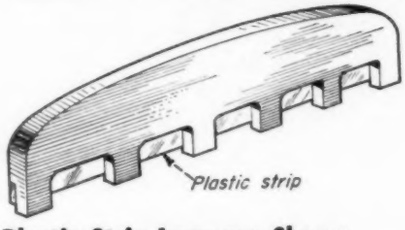
The lower figure shows a composite shim block that was made from ⅛-in. shims all of the same size. Two ½-in. cover plates are added to the stack and a vertical bar with a rectangular cross-section holds them together. Holes through the shims are as wide as the bar, but about twice as long. This allows slipping them in and out to set up the desired height. These shims may be cheaper than the solid block and easier to make, especially if a die can be made for punching them out on a press. *S. Framurz, Bombay, India.*



Replaceable Die Handles Small Work

Sheet-metal punching can be done on a shoestring basis by making a die base that will hold a number of small dies for small jobs. The base is cut out in one side to allow scrap to fall to a bin.

A setscrew holds the small die in the base, which is undercut near the bottom to allow clamping it to a bolster plate. The punch is held in a steel plate and a rubber washer can be cemented to the plate to take care of the stripping. *Hans Bormann, Sao Paulo, Brazil.*



Plastic Strip Improves Shears

After we lost a few finger tips on our large squaring shears we made a simple guard that improved safety.

The front hold-down was milled off on the blade side to provide room for a strip of plexiglas—⅝ in. by ⅛ in. The milled section was ¾ in. by ⅛ in., leaving ⅛ in. clearance—the capacity of the shear. The strip was held in place by screws in tapped holes in each finger of the hold-down. *Bernard Levowich, Brookline, Mass.*

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58th Selection — J. R. Paquin's Side-Cutting Shaper Tool

NEWS OF METALWORKING

Northrop Subcontracts Entire B-49 Jet-Bomber Contract to Consolidated

WASHINGTON—The aircraft industry continues to buzz with procurement deals in the wake of the largest airplane and engine orders in peacetime history.

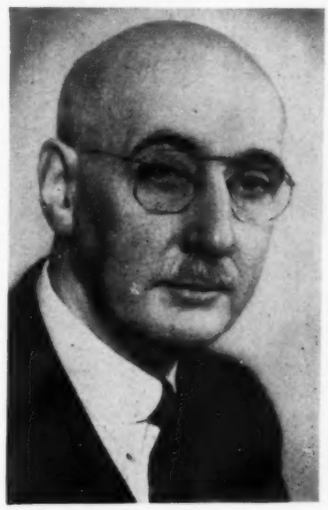
The biggest news was the deal of Northrop Aviation, Inc., of Hawthorne, Calif., with Consolidated Vultee to subcontract production of the entire B-49 giant eight-jet Flying Wing bomber. Northrop's limited plant facilities, capable of turning out only three B-49s a month was the main reason for the shift to Convair's sprawling (2 million sq. ft. of floorspace) Fort Worth plant where the world's largest bomber, the six-engine B-36, is now under production. Initial B-49 order is for only 30 of the $2-million jet bombers. Move to Convair revealed a sudden shift to high Air Force priority and future assurance of quantity production for the jet Flying Wing which has been performing sensationally (500 mph. top speed and 9 hours endurance) during its secret trials at Muroc Dry Lake, despite the crash of one experimental model recently.

Present plans call for end of B-26 production at Fort Worth next November with B-49 production rolling at a one-a-week rate shortly afterward. In the meantime, fiscal 1950 funds that become available in July of 1949 will provide a large boost in the B-49 order. Production studies for increments of 100, 250 and 500 additional jet Wings have been completed. Exact size of the order will depend on the international situation.

Under the subcontract to Convair, unique in peacetime aircraft production, Northrop will maintain control of all technical work on the program including design, production and tooling engineering and will be paid by the Air Force for this work. Convair will furnish manufacturing equipment and personnel. The deal explained recent rumors of a Northrop-Convair merger and was a windfall for the new Floyd Odlum-controlled management of Convair headed by Lamotte T. Cohu, ex-Northrop and TWA president. Convair got no prime contracts in the fiscal 1949 military plane-buying program and has been operating deeply in the red.

Other developments included a triumph for Boeing Airplane Co. of Seattle in the latest Air Force jet bomber-design competition that will continue that company's dominance in the long-range, heavy-bomber field. Boeing edged 12 other manufacturers in the hottest single competition since the war ended. Boeing's winning XB-55 design calls for a plane larger than its six-jet XB-47, already in flight-test stage, and powered by four turboprops (gas turbine engines driving propellers).

To ease its labor pains caused by a two-month-old mechanics' strike, in its Seattle plant, Boeing expanded its subcontracting program on its B-50 bomber to Douglas Aircraft of Santa Monica, Northrop, Beech, Cessna, and Ryan. Meanwhile Curtiss-Wright at Columbus was making tail assemblies for the Republic Thunderjet fighter.



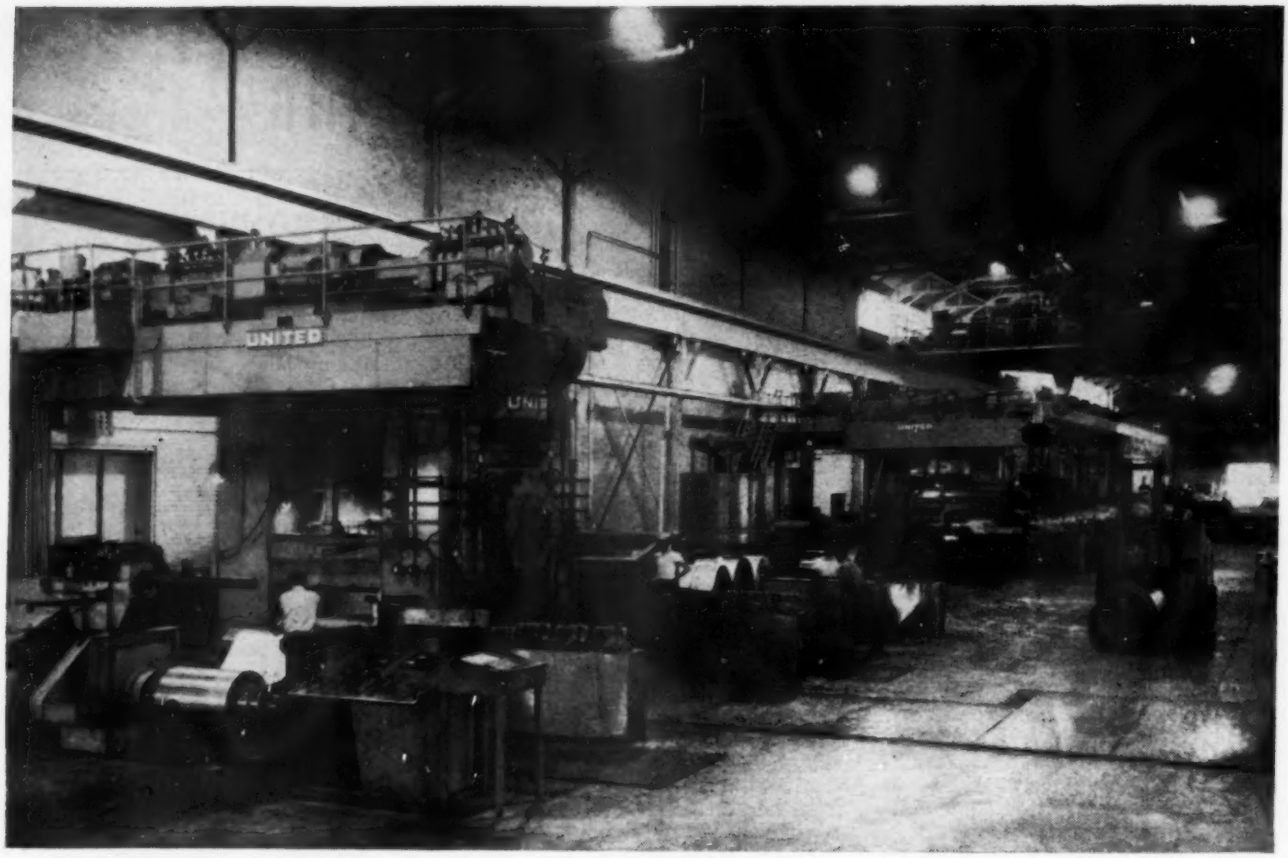
Thor M. Olson

Thor M. Olson Resigns Post

DETROIT—Thor M. Olson, vice president in charge of sales of the Ex-Cell-O Corp., has resigned after serving in the company since April 30, 1930.

He came to Ex-Cell-O when his company, The Continental Tool Works, merged with the corporation. He was a native of Sweden and as a young man worked in machine tool shops of Rockford, Ill., and Detroit, later becoming active and prominent in the cutting tool industry. He was the principal organizer of two cutting tool companies, including Continental. In addition to his vice presidency, he was a member of the board of directors.

***REAR-MOUNTED** engine, with tools placed in front and operator between, has given Allis-Chalmers' model G tractor a "new look" as well as excellent visibility for the driver of the tools in use. Low-cost, quick-hitch implements are designed for the tractor*



***STAINLESS STEEL** is rolled 54 and 66 in. wide in these two mills at the Republic Steel's new plant in Massillon, Ohio. An inspection table for sheet and strip is shown below*

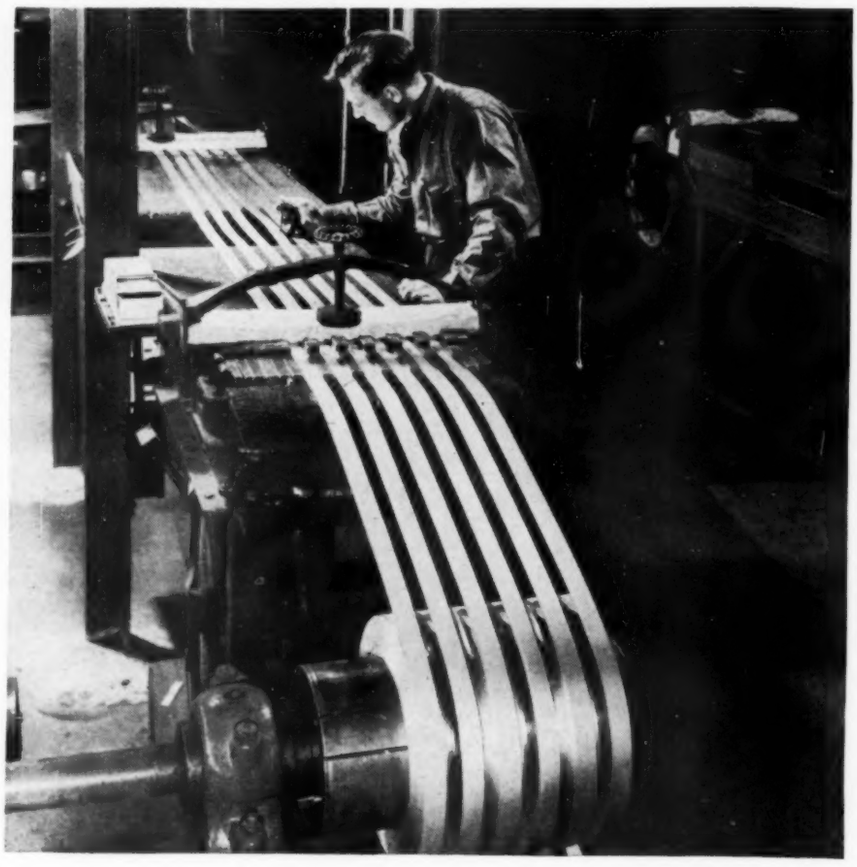
Stainless Steel Plant Is Opened

MASSILLON, OHIO—Republic Steel Corp.'s new Enduro Plant No. 2 is now in operation here and the new facilities are reported to have doubled the concern's output of stainless steel sheets, which are in ever-increasing demand.

The new plant supplements facilities known as Enduro Plant No. 1, where flat-rolled stainless steel in widths up to 30 in. is produced. Sheets more than double that width will be rolled in the new facilities.

The new stainless steel cold reducing, annealing, pickling and finishing facilities of plant No. 2 have been erected in existing buildings at Republic's Massillon steel plant. The buildings have been completely remodeled. Melting and refining is done in electric furnaces, cast into ingots and rolled into slabs at the Canton plant and shipped to Warren and Cleveland for hot rolling, then sent to the Enduro plants for the remainder of the operations.

The new plant is well-lighted and airy. Where finishes are so essential it is by necessity that the plant be clean and every effort has been made to accomplish this.



Sellers' Firm in 100th Year Of Operation

ROCHESTER, N. Y.—The William Sellers & Co. Division of Consolidated Machine Tool Corp., oldest continuous builder of machine tools in America, is now celebrating its one hundredth anniversary. During these 100 years the company and its founder, William Sellers, contributed much to industrial progress of the nation.

In 1862 Sellers turned out the machine tools required to build the Monitor during the Civil War. During the Spanish-American war the company made the machine tools which helped build the U.S.S. Oregon, the battleship that made the record dash around Cape Horn from the Pacific to the battle front in the Atlantic. In 1918 and 1943, during the first and second World Wars, further honors were awarded to the company by the government.

Established in 1848

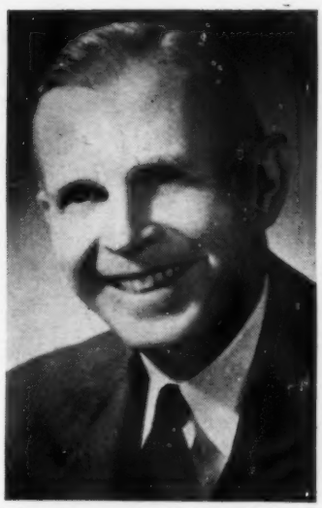
William Sellers & Co. is the oldest in years yet the youngest to join Consolidated. It was established in 1848 by William Sellers who was termed the "greatest mechanical engineer in the world" by Sir Joseph Whitworth. He invented or improved many of the fundamental machine tools which made possible the locomotive, the harvester, the printing press, the automobile and other developments. He formulated the standards for screw threads; had he done nothing more than this he would have made an outstanding contribution in helping to shape machine progress of this country. His screw thread standard was adopted in the United States as the Sellers standard screw thread. Later it was called the United States standard screw thread.

Varied Line Produced

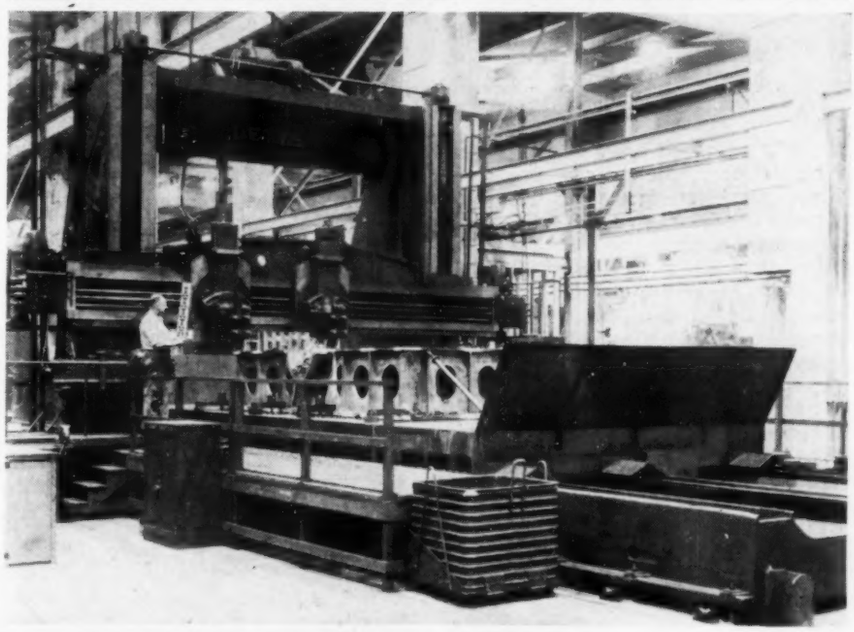
One of William Sellers' best-known inventions is the spiral gear planer drive patented in 1862.

The William Sellers & Co. line includes railroad tools such as lathes for turning coach wheels and locomotive driving wheels, machines for turning railroad car wheels, driving box boring and facing machines and locomotive frame slotters. Other tools include large horizontal boring, drilling and milling machines; large double-housing and openside planers, boring and turning machines; plate planers; turret track turning machines; drill and tool grinders; and other special machines.

Many pieces of equipment built in the early years of the company are still in operation.



***WHITLEY B. MOORE** (Left) has been elected vice president in charge of sales of the Timken Roller Bearing Co., Canton, Ohio, succeeding L. M. KLINEDINST, who has retired after 43 years with the company. He will remain with the company as a director and sales consultant*



***NOW 99 YEARS OLD,** a Sellers 24-in. planer is still in production (Left). A heavy-duty planer (Above) of modern design dwarfs the older machine. Both machines were built by William Sellers & Co., now a division of Consolidated Machine Tool Corp.*

Ralph J. Kraut

John H. Daum

W. E. Rutz

Giddings & Lewis Machine Tool Co. Purchases Cincinnati Planer Co.

CINCINNATI — The Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has purchased all the capital stock of the Cincinnati Planer Co. at a reported price of $3 million. Negotiations, under way for some time, were completed during the Cincinnati Planer Co.'s fiftieth anniversary year.

Ralph J. Kraut, president Giddings & Lewis, becomes president also of Cincinnati Planer. John H. Daum, now executive vice president and general manager of Cincinnati Planer, will continue in that capacity. W. E. Rutz, executive vice president Giddings & Lewis, will be vice president of Cincinnati Planer.

Other officials of Cincinnati Planer will be: Jesse Daugherty, vice president and works manager; R. J. Steiner, secretary and comptroller; R. E. Hanson, treasurer and counsel; R. D. Allison, assistant treasurer and assistant secretary; E. W. Kroeger, assistant sales manager; C. J. LaMoth, executive assistant; W. B. Wigton, chief electrical engineer; J. W. Knippling, purchasing agent; and J. G. Daum, production manager.

The Cincinnati Planer Co., builder of planers, vertical boring and turning mills and of planer type milling machines, will be operated as a wholly-owned subsidiary of Giddings & Lewis. It has about 400 employees. Though products of Giddings & Lewis (horizontal boring, drilling and milling machines) and Cincinnati Planer are non-competitive, they supplement and enhance each other.

Calendar

American Society of Tool Engineers—Semi-annual convention—Oct. 11-13—Los Angeles.

American Welding Society—Annual meeting—Oct. 24-29—Philadelphia.

National Instrument Conference and Exhibit—Sept. 13-17 — Philadelphia Convention Hall.

National Metal Congress and Exposition, American Society for Metals—Oct. 25-29—Philadelphia.

National Plastics Exposition, Society of the Plastics Industry—Sept. 27-Oct. 1—Grand Central Palace, New York.

Packaging Machinery Manufacturers Institute—Annual Meeting—Oct. 12-13—New York.

SAE National Tractor and Diesel Engine Meeting—Sept. 7-9—Milwaukee, Wisc.

Names Requested For Steel Honors

CLEVELAND—Nominations for Distinguished Service awards of individuals who have made outstanding contributions to the development, application and progress of alloy steels will be accepted from readers of the AMERICAN MACHINIST. The awards will be in connection with the "Salute to Alloy Steel" celebration at the 30th annual Metal Congress and Exposition in Philadelphia, sponsored by the American Society for Metals, Oct. 25-29 in Philadelphia.

Nominations should be sent to J. M. Schlendorf, chairman, Distinguished Service Awards Committee, c/o Republic Steel Corp., Republic Building, Cleveland 1, Ohio.

***QUALITY** of cold-finished steel production at Jones & Laughlin Steel Corp.'s Pittsburgh Works, is closely controlled with modern testing apparatus, part of a newly completed expansion of laboratory and warehouse facilities*

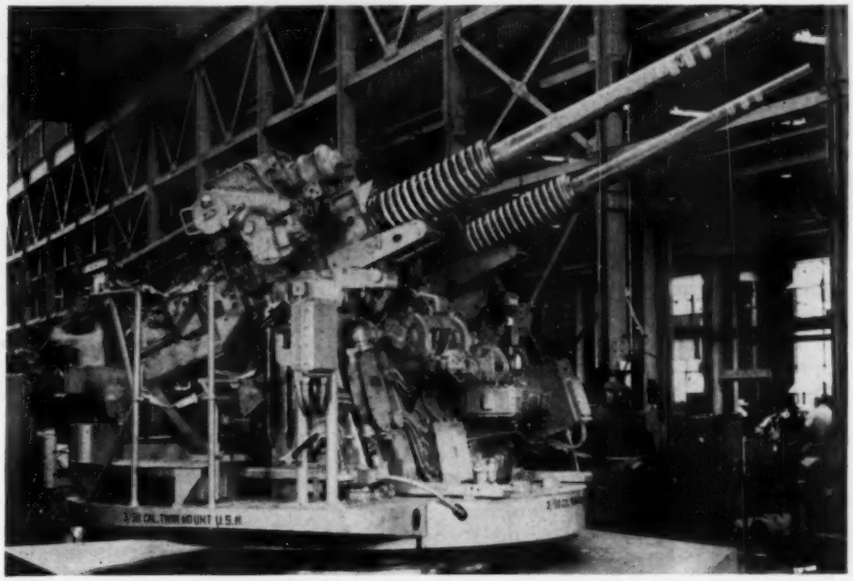
Detroit

G.M. TO INCREASE TRANSMISSION FACILITIES...FOUNDRY STRIKE FELT...ENGINE COMPRESSION CHANGES PROPOSED

A goodly amount of machine tool business is in prospect at General Motors, mainly in the gear-cutting field. The corporation's Detroit Transmission Division will shortly embark on construction of a new 250,000-ft. unit west of Detroit, in Livonia township, to supplement the facilities of the main transmission division plant in midtown Detroit.

The new unit is now in planning stages; structural steel awards are being considered, and the general building contract will follow. For the moment there are no solid estimates of the amount of tooling the plant will contain. But the fact that some 1,500 people will be employed indicates substantial machine requirements.

The Livonia shops will function as a feeder for the main plant. But the fact that space is at hand for expansion purposes—whereas none can be had in the vicinity of the parent shops—leads to the conclusion that ultimately the new facility will be the centerpiece of the Transmission Division's operations.



***RAPID-FIRE** twin-mount Navy gun, 3 in./50-caliber type, is the result of attacks by Japanese Kamikase "suicide" planes during the war. The unit is being installed on major combatant ships of the fleet (Official U.S. Navy Photo)*

Transmission Demand Heavy

Sustained demand for Hydra-Matic transmissions from the G.M. Pontiac division is the reason behind the decision to build the new plant. About 75% of Pontiac's orders since the automatic mechanism was made available last spring have included the Hydra-Matic; more would be so specified if they were available. Together with nearly 100% ordering from Olds and Cadillac, this has choked manufacturing facilities.

The new plant will not make parts for the Buick Dynaflow transmission, nor for any mechanism which Chevrolet may introduce next winter. Anything Chevrolet does will probably be manufactured in its own gear and axle division.

Some tool buying is coming out of the Army's Detroit Arsenal. In original postwar planning of the services, this facility was to do tank and armored vehicle research, but since then the objectives have been broadened to take in road-building machinery and mobile equipment of great diversity. The expansion of development work in these directions apparently accounts for the continuing—although not large—orders for equipment, much of it in tool room category.

Automobile production during August was shadowed by supplier strikes. The Campbell, Wyant & Cannon Foundry tieup at Muskegon had shut down Hudson, Lincoln, Willys, and a few of the truck companies. The recently-settled month-long tieup at Timken-Detroit Axle Co., had cut into output of Ford trucks and other trucks; settlement came while other producers were on the brink of closings.

The current period also finds Nash shut down, but in this instance the reason is changeover. Nash will go into production on its 1949 models in September.

As soon as the CWC tieup ends, the outlook is for a fairly sustained period of output weeks in the neighborhood of 110,000 units or more. The month began around that level, but tapered soon afterward.

Speaking recently at a westcoast S. A. E. meeting, three G.M. technicians reported on a subject of compelling current interest—high-compression engines. Their conclusion was that higher costs of top octane gasolines woud be justified by economies in mileage.

With present commercial gasolines of 70 to 90 octane, suitable for engines within the 5 and 7-to-1 compression range, they reported that an engine converts from 20% to 33% of combustion heat into mechanical energy with full throttle. Compression ratios of 12 or more to 1, and use of selected fuels, produce thermal efficiencies as high as 40%.

Some clue as to the ratio of forthcoming Cadillac and Olds engines, due for 1949 model installations, was furnished in mentions that "8-to-1 ratios produced economy gains as high as 25%."

"It has been pointed out," they said, "that the petroleum industry now has manufacturing capacity of produce about 20% of its total volume of gasoline in the 96-98 research octane range. This would be sufficient to supply gasoline for several years' production of cars requiring this type of fuel."

To reach beyond 20%, however, is the problem. One solution: Equip cars with dual fuel systems, so the carburetor would be supplied with high-octane gasoline only when the throttle is wide open enough to require high-octane fuel. Another proposal involves injection of a mixture of methyl alcohol, water, and tetraethyllead.

However, these researches come out, it is evident that some notable changes are in store on engines. And with them will go increased machine tool orders. The coming year, in which the newer type Cadillac and Olds engines will be introduced (probably in ratio around 7.8-to-1) will be one of high significance for the machinery makers; they will be seeing the start of a trend which will ultimately compel large scale renovations of all engine manufacturing production lines.

These new G. M. models and others will apparently all be introduced by mid-January. That conclusion is prompted by a General Motors engagement of space in New York for a gala showing of its products, covering the last two weeks of January. The advance reports indicate that G.M. is intent on going the recent spectacular Ford 1949 model introduction one better.

Freight Rates Increased; Coal And Metals Hit

WASHINGTON—Rail freight rates have gone up again on at least 24 commodity classifications. A complicated Interstate Commerce Commission freight rate order—effective Aug. 21—added $67.4 million annually to the nation's freight bill.

But to take part of the sting out of the order, at the same time ICC cut rate maximums on 21 commodity classifications.

Ores, concentrates, raw metals and products, and coal will bear the brunt of the rate boosts. Construction materials—brick and tile, cement, sand, stone, marble—will benefit by the cut in rates.

The new increases will be over and above three recent temporary increases granted by ICC. These increases—which boosted rates about 21.5% over last October—are made permanent by the order. But in making them permanent, ICC did some jiggling which accounts for the $67.4-million boost:

(1) It revised the maximum permissible increase for certain commodities—adding $65.2-million.

(2) It raised protective service charges an additional 5% to a total of 15%—adding $2.2-million.

All in all, by making its three temporary orders permanent, and slightly changing them, ICC has put rates 22.6% over the October, 1947, level.

But there had already been some upward revisions in 1946 and 1947. So all told, rates are now up around 44% since war's end.

As usual, ICC's order didn't jump rates uniformly. Here are the increases over the 1947 base by territory:

Within Eastern	30%
Within Southern	25%
Within Zone I of Western	25%
Within other Western	20%
Between Southern and Western; and between Southern and Western on one hand, and Eastern on the other	25%
Between Zone I and the rest of Western	22½%

All these are the same as in the temporary orders with this exception: The increase between Zone I and the rest of the Western had been 25% before.

The thing shippers will look at most closely, however, is the overhaul of the "maximums." A maximum is a flat-figure limit to a rate hike. For example:

You are shipping aluminum within Eastern territory. Before October, 1947, it used to cost you, say, $15 per net ton for a certain haul. Now rates have gone up 30% within Eastern, so theoretically you should pay $19.50. But you don't. The ICC has slapped a maximum of $3.20 a net ton on the rate increase for aluminum. And your bill therefore is only $18.20. In short, a maximum is a ceiling beyond which rate increases can't go.

Listed below are the amounts by which some maximums have been raised over prior levels (in cents per net ton):

Aluminum angles, bars, etc.	$0.40
Aluminum pigs	.40
Chrome and manganese ores and concentrates	.90
Cinders, slate, and shale	.87
Copper, brass, bronze articles	.40
Dolomite, roasted	.37
Granite paving blocks	.10
Iron and steel articles, axles, bars, etc.	.40
Iron and steel articles, mfd	.40
Iron and steel scrap	.40
Iron and steel wire	.40
Iron ore other than Upper Lake Port rates	.05
Lead and zinc, anodes, etc.	.40
Limestone (in closed equipment)	.87
Marble granite (in closed cars)	.87
Nails, spikes, etc.	.40
Perlite rock	.87
Pig iron	.40
Rails and railway track material	.40
Railway car axles	.40
Tank and tank materials	.40
Tin or terne plate scrap	.40
Trucks	.40
Vermiculite, crude	.87

Here are some of the principal decreases in maximums:

Brick and tile	$0.60
Cement	.40
Cement building blocks	.60
Cinders	.03
Clay, in open tops	.90
Conduit	.60
Dolomite, unroasted in open tops	.03
Fullers earth	.03
Furnace slag	.03
Iron ore tailings	.03
Lime	.80
Oyster shells	.03
Phosphate rock, phosphate sand and clay	.20
Plaster	.80
Pumice	.03
Sand, molding	.06
Other sand or gravel:	
In open cars	.03
In closed cars	.06

PRESENTING *50-year service award to J. E. Schuman is M. A. Hollengreen, president of Landis Tool Co., Waynesboro, Pa. J. W. Little, another 50-year veteran, is in the foreground. Two hundred and one employees received pins for 20 years or more service*

Landis Tool Honors Veterans

WAYNESBORO, PA.—Landis Tool Co. recently honored 201 men and women with awards of gold pins set with precious stones for 20 or more years of service. Nearly 225 attended the banquet at which M. A. Hollengreen, president of the company, made the presentations.

The persons honored had a combined total of 5396 work-years.

"The brains of the nation are in the people, its strength is in the hands of the people, and its wealth is what they produce," Tell Berna, general manager National Machine Tool Builders' Association, told the gathering. "You have made Landis a shop term in every industrial nation in the world," he said, and complimented the workers especially for the "tremendous task" accomplished during the last war.

Discussing the Economic Recovery program, A. G. Bryant, president of the NMTBA, pointed out that the machine tool industry would play an important part if the plan were to prove in any way successful.

Names in the News

***GEORGE P. LEHMANN** (left) has been appointed to the personal staff of Dr. Zay Jeffries, vice president of the General Electric Co., and ROBERT L. GIBSON has been named to succeed Mr. Lehmann as manager of the Plastics Division with plants in Meriden, Conn.; Taunton, Mass.; Pittsfield, Mass.; Scranton, Pa.; Coshocton, Ohio, and Decatur, Ill.*

Lloyd L. Lee, former vice president in charge of sales and engineering for the Plan-O-Mill Corp., has joined Cleveland Republic Tool Corp., as manager of their Detroit office.

Robert W. Frank has been named president and general manager of the Lewis Foundry & Machine Division, Blaw-Knox Co., Pittsburgh.

Marvin W. Smith has been appointed executive vice president of the Baldwin Locomotive Works with offices in Eddystone, Pa.

Walter G. Lohmeyer, Jr., has been named chief engineer and production manager of Vistagraph, Inc., Danbury, Conn.

Edward C. Wells has been appointed vice president, engineering; **Lysle Wood,** chief engineer, and **N. D. Showalter,** assistant chief engineer, by Boeing Airplane Co.

Walter George Wheeler has been named chief engineer of the Hufford Machine Works, Inc., Redondo Beach, Calif.

David F. Robinson and **William E. Rudel** have been appointed vice presidents and district sales managers in charge of New York and Hartford, Conn., and Boston office, respectively, of the Rudel Machinery Co., Inc., New York City. **Ransom Soper** will take charge of the Long Island territory, **George E. Gcimpidis** has been named chief engineer and **J. E. Baxley,** hydraulic engineer.

George C. Gibbons has been appointed resident manager of the Norton Co.'s plant in Bauxite, Ark.

Joseph Chini has been named superintendent of the Foundry Division, Sperry Gyroscope Co., Great Neck, N. Y., succeeding **Stanley E. Tims** who has left the company.

G. William Warner, chief inspector for 32 years for Allis-Chalmers Mfg. Co., has retired.

Edward A. Halbleib has retired as general manager of Delco Appliance Division, General Motors, at Rochester, N. Y. He is succeeded by **Paul H. Rutherford.**

Frederick M. Bock has been appointed assistant to the president of Pioneer Engineering & Mfg. Co., Detroit.

Waldemar Naujoks has joined the staff of Girard Associates, Chambersburg, Pa.

Sigmund A. Czarnecki has been shifted from production engineer to master mechanic of the Hamilton Standard Propellers division, United Aircraft Corp., East Hartford, Conn. **Charles B. Conwell** has been named process engineer and **Edward M. Bancroft** has been appointed acting production engineer.

George L. Roth has been elected president of the White-Roth Machine Corp., Lorain, Ohio, succeeding **G. A. White** who has retired. **I. G. Roth** has been named vice president, **M. J. Powers,** secretary, and **Harry Youtt,** general manager.

Loren J. O'Brien has been appointed chief engineer of the axle division, Spicer Mfg. Division of Dana Corp., Toledo, Ohio.

A. M. Fleming has been named vice president in charge of manufacturing of Chrysler Division, Chrysler Corp., and **Fred A. Wunderlich,** general works manager, succeeding Mr. Fleming.

Arthur W. McKinney has been named vice president and general sales manager of the National Supply Co., Pittsburgh.

Ralph S. Drummond has been named manager of the Cincinnati Crocker-Wheeler branch office.

John S. Conant has been appointed general purchasing agent of Willys-Overland Motors, Toledo, Ohio.

A. E. Whyman

A. E. Whyman, managing director of E. W. Bliss (England) Ltd., has been elected vice president in charge of European operations of E. W. Bliss Co., Detroit.

George W. Smith, Jr., has been elected president of De Laval Steam Turbine Co., Trenton, N. J., succeeding **H. L. Watson,** who retired after 35 years of service.

Business Items

Central Forge Co., Toledo, Ohio, has been incorporated and will produce small forgings for automotive and agricultural equipment. Francis G. Flynn is president and Harold Wilkinson, secretary.

Joseph T. Ryerson & Son, Inc., has opened a steel-service plant in Emeryville, Calif.

Westinghouse Electric Corp. will reactivate and operate the Naval Industrial Reserve plant in Kansas City, Mo., to produce axial-flow jet aircraft engines.

Hamilton-Thomas Corp. has been formed in Hamilton, Ohio, as a change in the corporate structure of Economy Pumps, Inc., which occupies manufacturing facilities with two subsidiaries, Liberty Planers, Inc., machine tool manufacturers, and Klipfel Mfg. Co., makers of regulator valves. H. R. Thomas is president.

The Jeffrey Co., Columbus, Ohio, has purchased the controlling interest in the Case Crane and Kilbourne-Jacobs Co., which will operate as a subsidiary of Jeffrey. Case manufactures materials-handling equipment and is headed by Kenneth B. Norton.

Hercules Stamping Co. has moved into its newly-purchased factory building in Pemberville, Ohio.

Wendt-Sonis Co., Hannibal, Mo., manufacturers of carbide cutting tools, has set up two new warehousing facilities, one in Chicago at 1361 West Lake Street under J. J. Gardenhire and another in New Rochelle, N. Y., at 909 Main Street in cooperation with Eastern Carbide Corp. Walter Ruppel and Tony Allen are in charge.

General Electric Co. has located its entire welding equipment business in the New England states. The final components of the Welding Equipment Divisions were moved to Fitchburg, Mass., recently.

National Screw & Mfg. Co., Cleveland, has acquired the business and manufacturing facilities of the Apco division, Lorraine, Inc., Los Angeles.

Cutler-Hammer, Inc., Milwaukee, Wisc., has acquired the business of West Electric Products Co., Los Angeles.

Aero-Coupling Corp., Burbank, Calif., is operating under license issued by Aeroquip Corp., Jackson, Mich.

Du Pont Co. has completed a new plastics plant near Parkersburg, W. Va.

Howard Foundry Co., Chicago, has purchased Belmont Magnesium Foundry, Belmont, Calif.

Marquette Machinery Co., Detroit, has moved to 3800 Maple Ave., Dearborn, Mich.

International Powder Metallurgy Co., Ridgeway, Pa., has been organized with M. T. Victor, president; G. J. Hoehn, vice president in charge of production, and secretary, E. C. Berger.

Lovejoy Tool Co., Inc., Springfield, Vt., has purchased a new plant adjacent to the old one.

Stearns Magnetic Mfg. Co. has moved into a modern addition to its Milwaukee plant.

Hisey-Wolf Mfg. Co. and the Smith & Mills Co., Cincinnati, have purchased the Burke Machine Tool Co., Conneaut, Ohio.

Meade Specialties Co., Chicago, has named two new agents: R. M. Wright Co., Detroit, and Jackson-Walter Co., Philadelphia.

Hunter Pressed Steel Co., Lansdale, Pa., has changed its corporate name to Hunter Spring Co.

American Roller Die Corp., Cleveland, has acquired the patents of McKinney Tool Co.

Barth Stamping & Machine Works, Inc., and the Barth Mfg. Co. have been consolidated into a single corporation with offices at Denison Ave. and W. 34th Street, Cleveland.

Hauser Machine Tool Corp. has appointed Anderson & Clark of Muncie, Ind., as representatives.

The American Roller Die Corp., Cleveland, Ohio, has acquired patents and sales rights formerly held by the **McKinney Tool and Mfg. Co.**

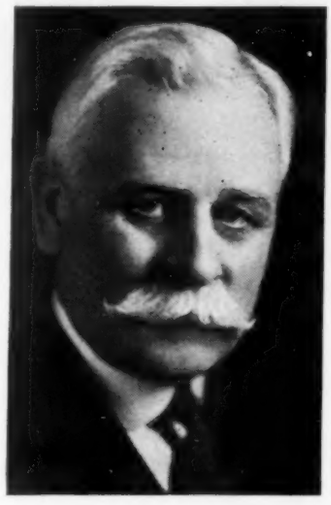
Kaiser-Frazer Corp., announces formation of the **Kaiser-Frazer of Canada, Ltd.,** with executive offices in Windsor, Ont.

Merz Engineering Co., Indianapolis, Ind., has acquired exclusive patent, manufacturing and sales rights to the line of Jack & Heintz electronic inspection equipment. The line is being marketed under the designation of Merz New-Tronic gages and sorting machines.

Rite-O Tool & Gage Co. has moved into its new building at 321 West Ten Mile Road, Hazel Park, Mich.

Electrolized Tap Corp. of Ohio has been incorporated in Cleveland with Norman H. Noble, president.

Obituary



John A. Coe

John A. Coe, former president of the American Brass Co., Waterbury, Conn., died recently at his home. He retired as chairman of the board in 1945.

J. Garrison Stout, 57, associated with the Lees-Bradner Co. since 1913, died at his home in Cleveland, Ohio, Aug. 3. He was chief of the standards department, directing final inspection, production control and technical matters.

Neil C. Hurley, 78, chairman of Independent Pneumatic Tool Co. and co-founder of the Hurley Machine Co., died at his home in River Forest, Ill. Aug. 3.

Frederick A. Stevenson, former president of American Car & Foundry Co., died in Wilmington, Del., July 29. He retired in 1947.

Otto A. Wilke, 73, one of the founders of the Sheffield Machine and Tool Co., died recently in Dayton, Ohio.

Franklin Starr Jerome, 77, of New Haven, Conn., died June 22. He was president of Seymour Mfg. Co., and the Seymour Trust Co.

Noah P. Spayd, 75, one of the founders of Spayd Bros. Foundry and Machine Works, died recently.

Frederick H. Loomis, assistant general manager of sales for Republic Steel Corp. died July 1, following a long illness.

Thousands of 'em!

Thousands of Precisionaire standard semi-finished gaging plugs are carried in stock for quick delivery.

Shipments made within one week from receipt of complete information—24 to 48 hours in emergencies.

This world's largest stock of "immediately available" air gage tooling protects Precisionaire users against production holdups or shutdowns.

Sheffield's interest does not diminish with the purchase of a Precisionaire. The instrument must be kept constantly useful. Quick tooling service from this great stock assures you uninterrupted performance throughout the long life of the instrument.

It is wise and thrifty to specify Sheffield.

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Sheffield's principal products include Gages, Measuring Instruments, Machine Tools, Threading Tools and Contract Services. Standard Gages shipped within 24 hours.

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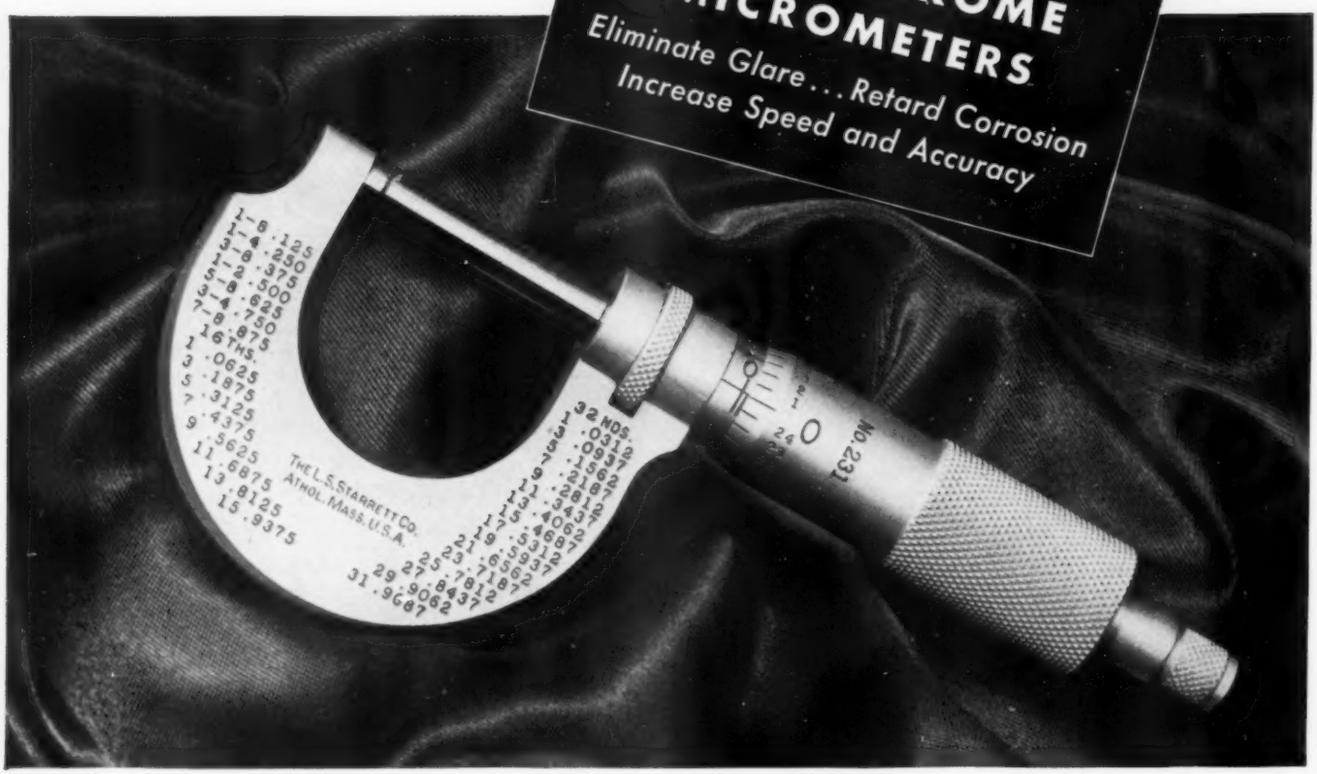
Eliminate Glare . . . Retard Corrosion
Increase Speed and Accuracy



Now *all* Starrett Micrometers—including the popular Thimble Friction type and the popular priced Black Frame type—will have the new, non-reflecting Satin Chrome Finish. No more squinting, no shifting to better light . . . the markings stand out sharp, clear and easy to read under any illumination. And eye-soothing Satin Chrome Finish is highly resistant to stains and corrosion.

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PLUS THESE BIG FEATURES AT NO EXTRA COST

- Hi-Micro (mirror-like) finish on faces of anvils and spindles to insure more accurate measurement.
- Threads hardened, stabilized and ground from the solid.
- Quick Reading Figures with every graduation on the thimble numbered for positive identification.
- Decimal Equivalents of 8ths, 16ths, 32nds and 64ths conveniently marked on the frame.
- Simple Adjustment for wear.

STARRETT

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS • STEEL TAPES • HACKSAWS AND BAND SAWS • PRECISION GROUND FLAT STOCK
Buy Through Your Distributor

THE L. S. STARRETT CO. • *World's Greatest Toolmakers* • **ATHOL, MASSACHUSETTS, U.S.A**

Sharpening Carbide Reamers . . . I

COURTESY THE STAPLES TOOL CO.

CONVENTIONAL SHARPENINGS

Reamers are end-cutting tools and accuracy of the body diameter is required as a limit to the cut taken by these end-cutting surfaces. Experience has shown that the most generally satisfactory sharpening is a simple 45° chamfer with adequate, yet not excessive, cutting clearance. Necessary cutting clearance varies with diameter. The large clearance angles on tools of small diameters are necessary to prevent rubbing of the heel of the cutting blade.

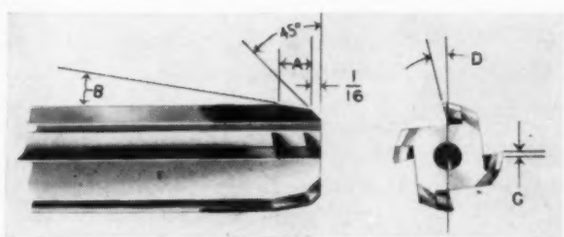
The width of the circular land on the cutting blades is more dependent on the abrasive nature of the material than any other factor. The more abrasive the material, the more rapidly the cutting edges of the chamfer or lead will dull. When these edges are dull the reamer is not cutting to size, but is being forced into the material the amount of the cut. If the land is too wide, the power required to drive the tool becomes excessive, particularly if the material being reamed is hard. In addition, excessive heat is generated.

When a burnishing action is desired in soft metals, the best results are obtained with wide lands.

If reamers are chipped by starting through the bushing, an aluminum bronze section will provide protection. This can be in the form of a washer recessed in the top of the bushing or a cap which fits over the bushing. In addition, spindle, reamer, and bushing should be perfectly aligned.

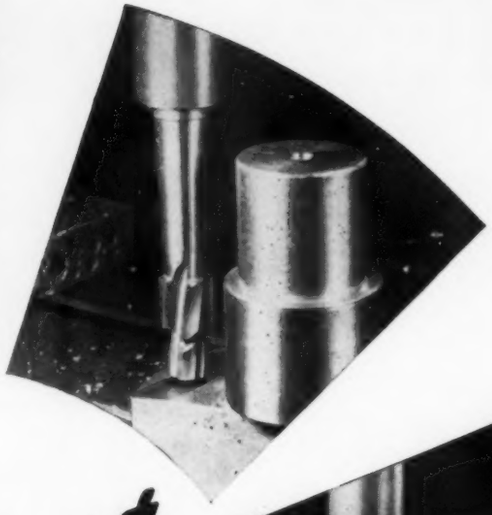
RECOMMENDED CLEARANCE ANGLES

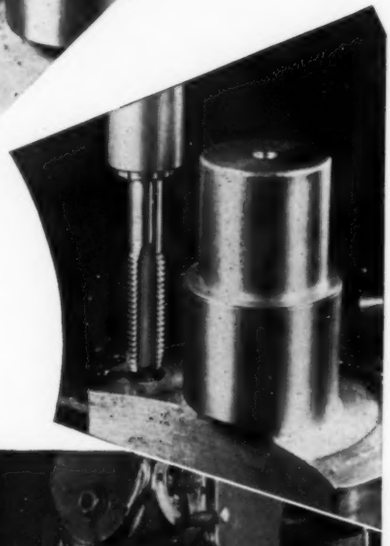
TOOL DIAMETER, IN.	PRIMARY CLEARANCE, DEG.	SECONDARY CLEARANCE, DEG.
¼ to ⅜	20 to 15	40 to 30
⅜ to ⅝	15 to 10	30 to 20
⅝ to 1	10 to 8	20 to 16
1 to 1½	8 to 6	16 to 12
Over 1½	6	12



SHARPENING RECOMMENDATIONS

MATERIAL	A LENGTH OF LEAD ANGLE, IN.	B LEAD ANGLE, DEG.	C CIRCULAR LAND, IN.	D RAKE ANGLE, DEG.
Aluminum casting	3/16	2	0.010-0.015	7 to 10
Aluminum casting (heat-treated)	0	0	0.030-0.040	0 to 7
Aluminum bronze	3/16	2	0.005-0.010	4 to 7
Bakelite	0	0	0.002-0.005	0 to 7
Bearing bronze	0	0	0.010-0.015	0 to 7
Brass	0	0	0.010-0.015	0 to 7
Cast Iron	0	0	0.010-0.020	0 to 7
Copper	0	0	0.005-0.010	7 to 10
Hard rubber	0	0	0.005-0.010	0 to 7
Low lead bronze	0	0	0.005-0.010	0 to 7
Magnesium	0	0	0.005-0.010	0 to 7
Steel (free cutting)	0	0	0.005-0.015	0 to 7
Steel (not free cutting)	3/16	2	0.005-0.010	5 to 7
Zinc	0	0	0.010-0.015	0 to 7

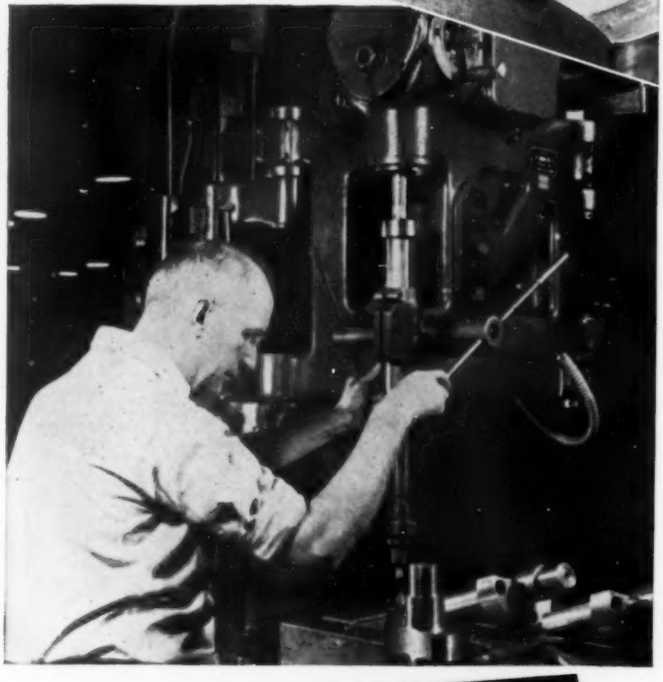




a radial drill that handles work *Fast*

● Speed and ease of operation is the big feature of Footburt-Hammond Radial Drilling Machines. The unique hinged bracket construction makes it possible to swing the drill head quickly from hole to hole. And the wide range of speeds is instantly available to take care of small or large tools. Tapping reverse is electrically operated by means of a separate hand lever; no additional adjustments required when changing for drilling to tapping. In-the-line operations may be handled faster with this handy machine.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: General Motors Building



FOOTBURT-HAMMOND

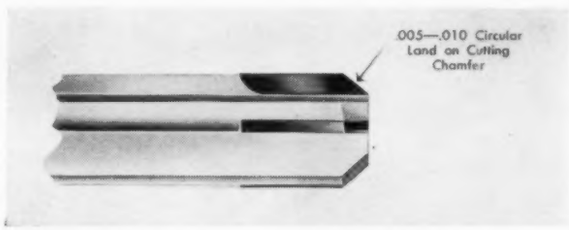
Radial
DRILLING MACHINES

Sharpening Carbide Reamers . . . II

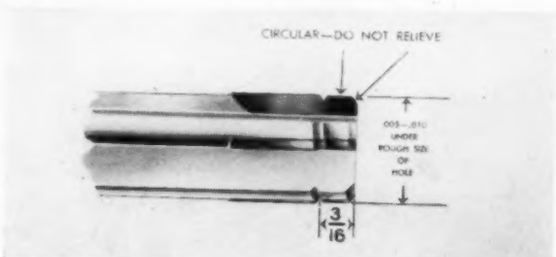
COURTESY THE STAPLES TOOL CO.

SPECIAL SHARPENINGS

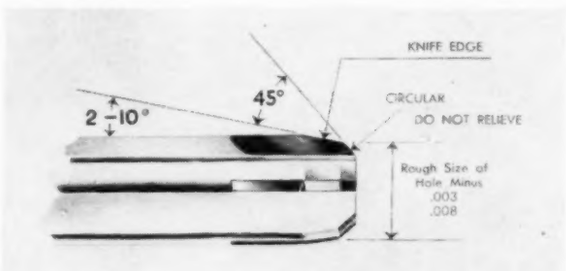
Conventional sharpenings work for most applications. Here are a group of special sharpenings that have been successfully used where the usual design would not give proper results:



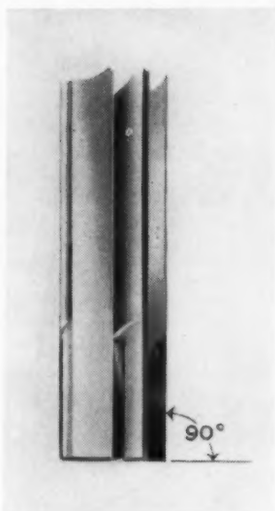
1 Effective simple sharpening for soft, free-cutting materials such as leaded bearing bronze or free-cutting brass



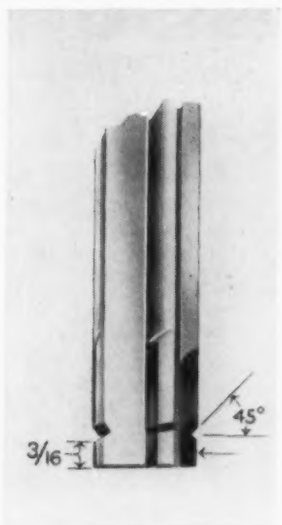
2 When a self-piloting sharpening is required, this is the best general-purpose shape



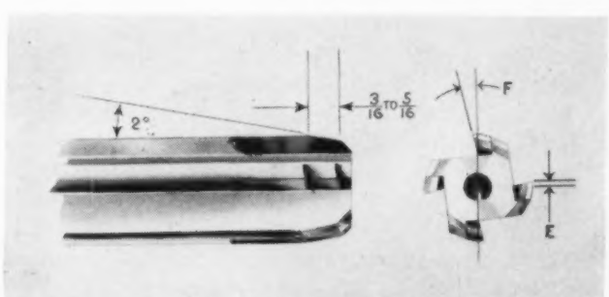
3 A simple self-piloting sharpening, this design is suited for materials which require a lead angle on the reamer



4 To correct the straightness of a hole, this 90° end sharpening cuts with an end milling action and does not tend to follow a crooked hole. However, there must be ample stock for the reamer to clean up all around the hole for this design to work

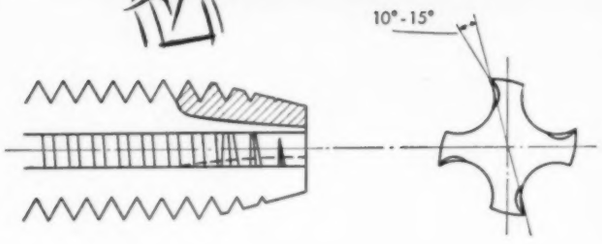


5 When chipping of a 90° sharpening is caused by the reamer striking the guide bushing, this modified grind is recommended. The end section is 0.005 in. undersize. It is also good when the tool cuts oversize because of a loose guide bushing



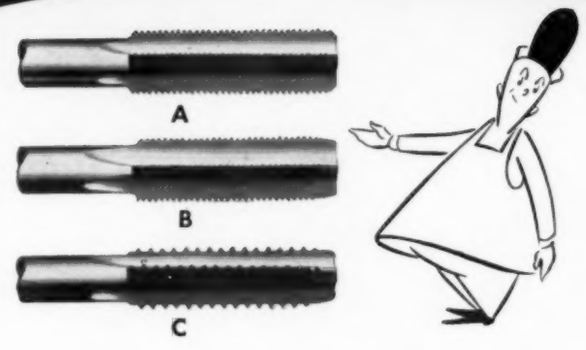
6 A typical lead angle sharpening. It is good for hand reaming and for some tough materials where a ribbon chip is desirable. This design increases the tendency to chatter and should not be used when the conventional 45° sharpening will work

Tips on Tapping ...by Stainless Sam



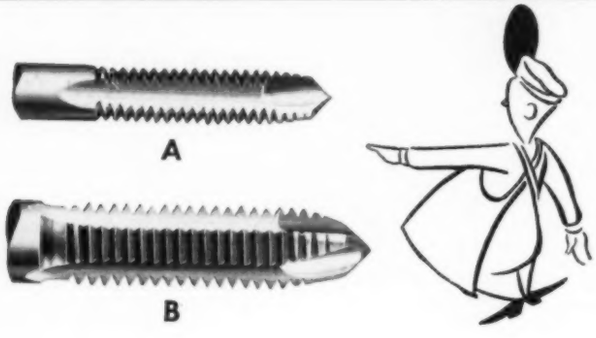
1 A 15° hook grind, which should include the first full tooth, has been found effective in tapping all grades of Stainless Steels. These taps are available commercially, or the hook can be ground in a standard tap as illustrated here.

This is especially important when tapping the chromium-nickel and high carbon grades of Stainless. Free machining grades can be tapped without difficulty when recommended procedures are followed.



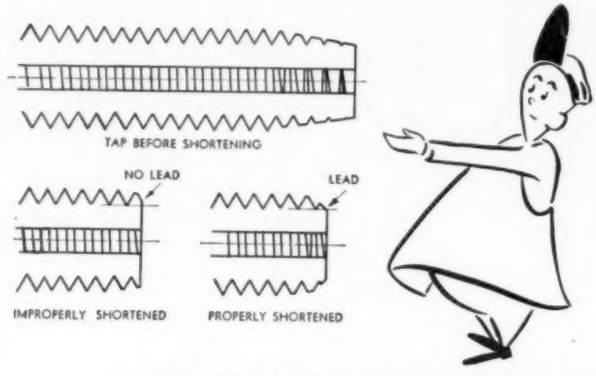
2 Tapping over 75% thread should be avoided if possible. A 50% thread is much easier to tap, and in many cases will hold satisfactorily. Taps should be kept sharp at all times.

For deep hole tapping, thin the lands by grinding the heels to reduce bearing areas as shown here, or use interrupted thread style tap. Figure A is standard ½-20 tap; B is a standard tap with lands thinned; C is interrupted thread ½-20 tap.



3 Collapsible type taps are successfully employed for large sizes (over 1" diameter). It is recommended that collapsible types of tap chasers be ground with a 15°-20° lip hook.

For through holes use two-flute taps, or the gun or chip-driver type as shown in this drawing. Figure A is a two-flute chip-driver tap; Figure B is three-flute.



4 Hints for close tolerance tapping: Up to size No. 6 use a two-flute tap; from No. 6 up to ½", a three-flute tap; over ½" a four-flute tap. Two-flute taps are the strongest, being designed for through holes. A three-flute has less tendency to cut oversize, but has less chip clearance. A four-flute is usually used for larger sizes and deep hole operation. For bottom tapping of all types, be sure you do not destroy the taper lead when shortening the tap. (See drawing).

For complete information on tapping and other machining operations, write for a copy of the new Armco booklet, "Machining of ARMCO Stainless Steels."

If you are not using ARMCO Stainless Steels there is a good chance that parts of your equipment or products could benefit by these rustless metals—often at no increase in cost. ARMCO Stainless resists heat and corrosion, adds strength and beauty to the products you make.

Remember, too, ARMCO Stainless Steel bars, wire and angles are available for quick delivery. In many cases your order can be shipped the same day it is received. Write or wire Armco Steel Corporation, 439 Curtis Street, Middletown, Ohio. Or call our nearest district office or Armco Distributor.

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ARMCO
STAINLESS STEELS

ARMCO

Sharpening Carbide Reamers . . . III

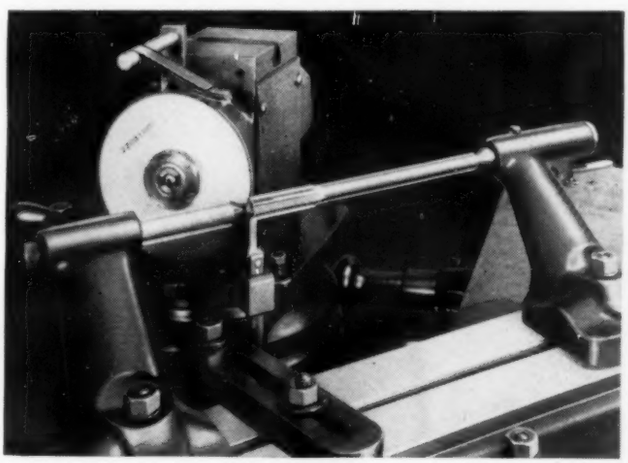
COURTESY THE STAPLES TOOL CO.

SHARPENING PROCEDURE

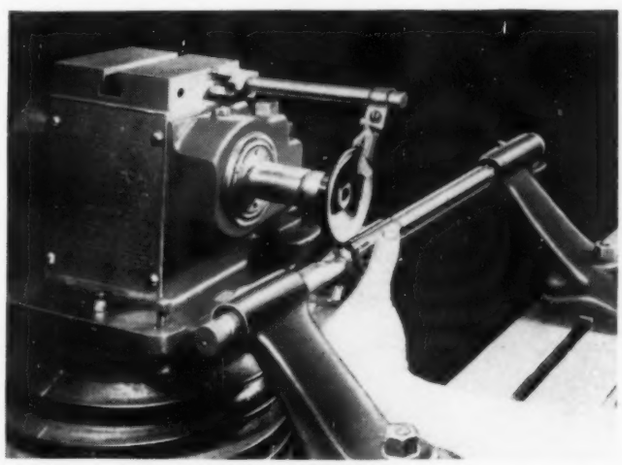
Setups pictured here are typical of the procedure that should be followed for proper reconditioning. Maximum life is assured only if a minimum of stock is removed in sharpening.

Do not attempt to recondition the outside diameter of the reamer by grinding. Instead, grind faces of flutes to remove low or rounded front edges. If necessary, the outside diameter can be lapped.

Maintaining sharp cutting edges by resharpening of the chamfer before the tool becomes extremely dull will greatly prolong the tool life and prevent excessive wear on the diameter.

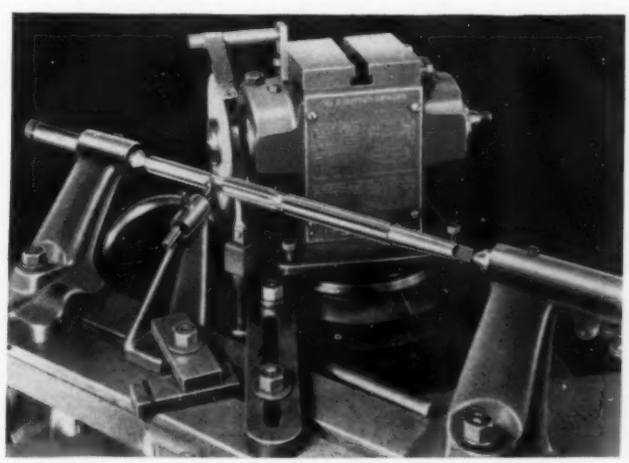


Sharpen chamfer with 220-grain wheel, 6-in. dia., with 1/16-in.-face. Peripheral grinding produces more accurate sharpening as path of O.D. of wheel is truer than path of cup wheel



Repair face of flute by grinding with 220-grain-20° concave-face cup wheel. Start with wheel cutting at base of tip so no more stock is removed than absolutely necessary for reconditioning.

If outside is damaged, expand 0.0005 in. and lap to size. Use No. 4 or No. 5 diamond powder mixed with olive oil. The split lap is made of bearing bronze. Always run tool backwards when lapping



Always steadyrest piloted tools when sharpening. This steadyrest is a standard diamond holder with notched 3/8-in. rod as tool support. Adjust support for height by setscrew, then clamp holder to the table

WARNING

Before you buy any screw machine

"Seeing is believing" has been a basic American philosophy for centuries. Most people didn't believe men could fly until the Wright brothers showed them. People questioned whether you could successfully combine sound with motion pictures until they saw their first talkie. Thirty years ago machine tool men wondered if our present high speed tools were practical. Today some feel the same way about carbides.

The dawn of all carbide tooling is here ...a reality now. Carbides have already revolutionized production standards on many machine tools in many shops.

Brand new standards of speed and economy will become common sooner than you think.

Will this threaten your machine investment?

And do you know that *New Britain makes the only automatic screw machines originally designed from the ground up with the power, speed, weight and rigidity to get the full benefit with carbides?*

Before You Buy, Get the Full Story
Write for Descriptive Literature

KEY TO CARBIDES:

POWER:

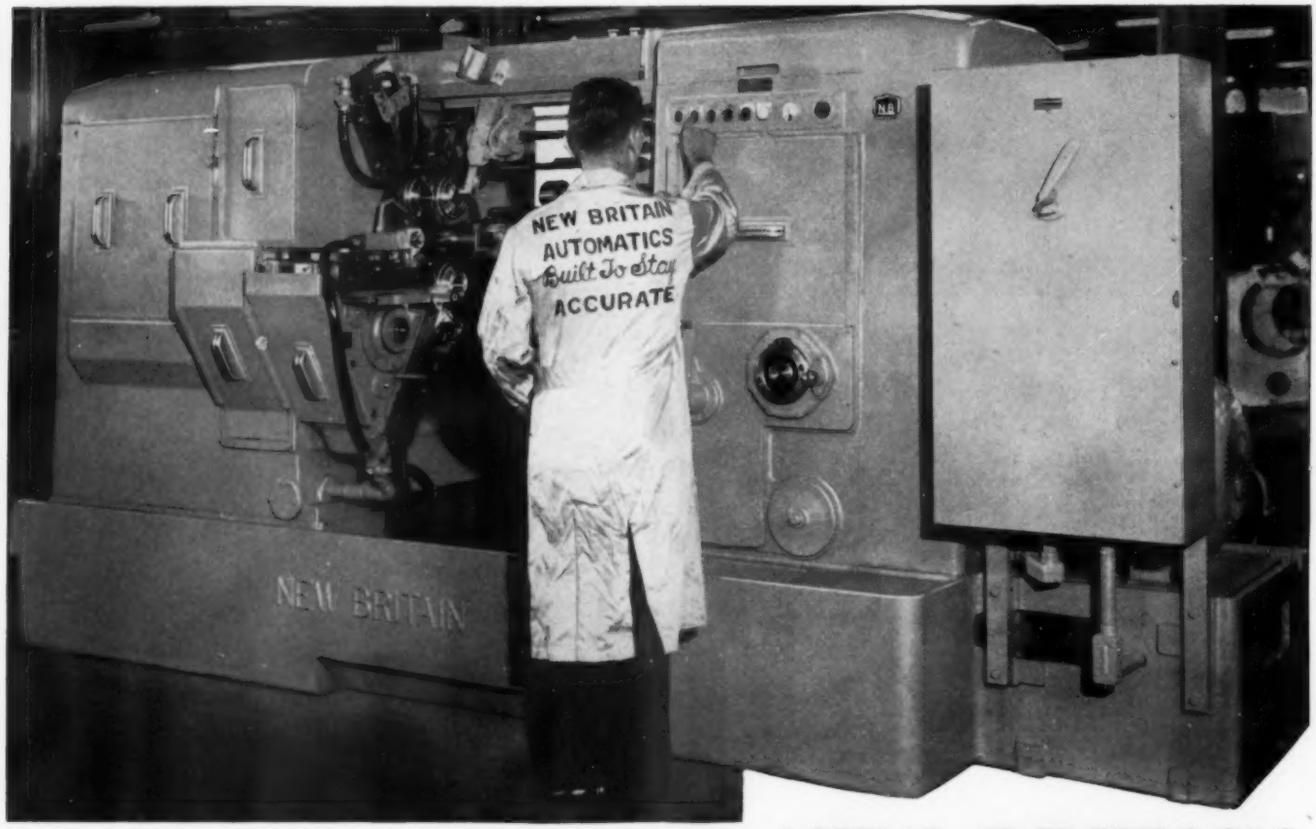
40 h.p. practical. Higher power rating under development.

SPEED:

Thousands marvelled at the Chicago Show to see our Model 601 Six Spindle Automatic Screw Machine turn out brass valve stems at speeds in excess of 4,000 r.p.m.— 3.2 seconds per piece including 1.2 seconds index time.

RIGIDITY:

Weights 16,000 lbs. (Model 601) to 23,000 lbs. (Model 602.) Direct camming eliminates deflection in all five heavy forming slides and main tool slide.



THIS ENTIRELY NEW LINE OF AUTOMATICS gives you full screw machine capacities with complete range of speeds and feeds for steel, aluminum and brass. (Large capacity, Model 602, illustrated with guards removed.)

New Britain Automatics Cost Less Per Finished Piece

848MK1

THE NEW BRITAIN MACHINE CO.
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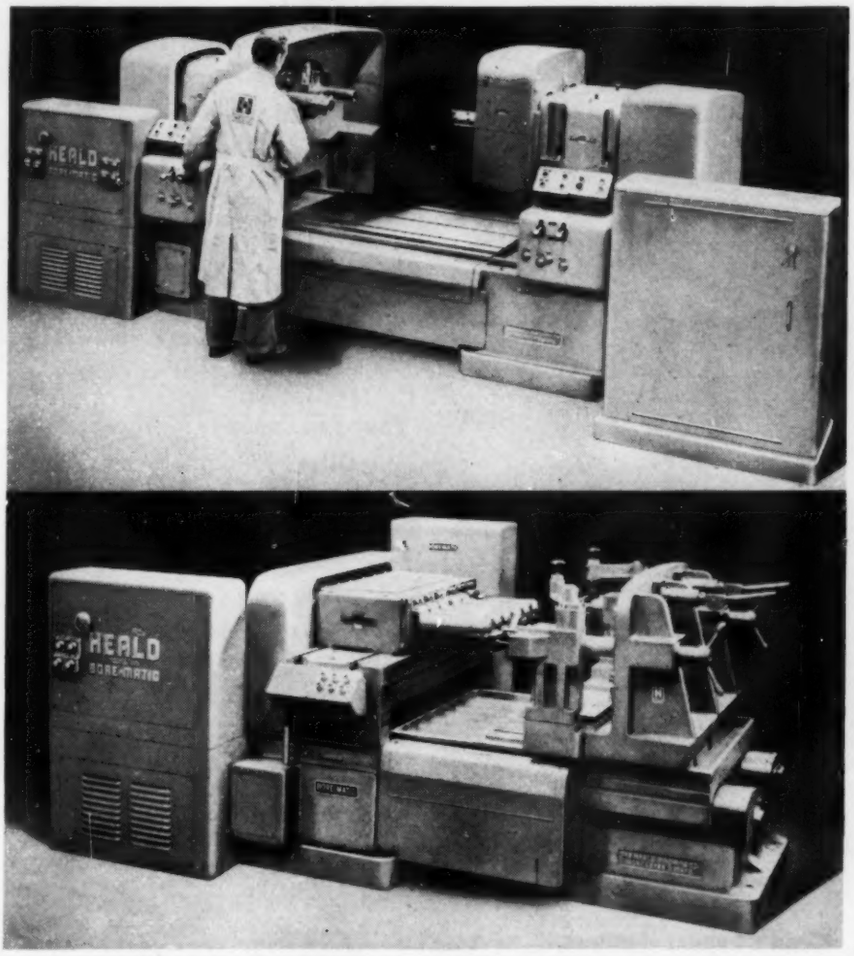
NEW BRITAIN, CONNECTICUT

Shop Equipment News



The fast range for "in" table feed for Model 521, lower illustration, Model 522, upper illustration, and 524, unillustrated, is from ½ to 32 ipm. The slow range for "in" feed, "out" feed, or both, on the three models is from ½ to 25 ipm.

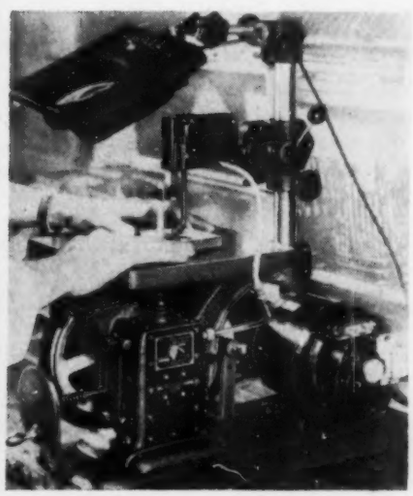
Three Bore-Matics by Heald, Offer Precision Operations on Heavy Work

A series of Bore-Matics designed for precision boring, facing, turning, chamfering or grooving on large, heavy work such as workheads, tailstocks, cylinder blocks, and connecting rods, is offered by The Heald Machine Co., Worcester, Mass.

The table is built low to the floor permitting easy loading from conveyor or overhead crane. Seven or more individual boring heads or a special multi-spindle head unit to suit the individual job can be installed on each bridge. Roughing and precision finishing can be performed at a single setting, eliminating an extra operation on many applications.

The Models 521 and 522 are standard single- and double-end machines respectively, the Model 524 being the single-end type with a long base for extra-capacity requirements.

A constant-pressure dump valve automatically furnishes the amount of oil required during each phase of the machine cycle. The width of bridges on all three models is 47 in. Maximum table travel on the Model 521 is 16 in., standard; the maximum table travel on the Model 522, and 524 is 30 in., standard.

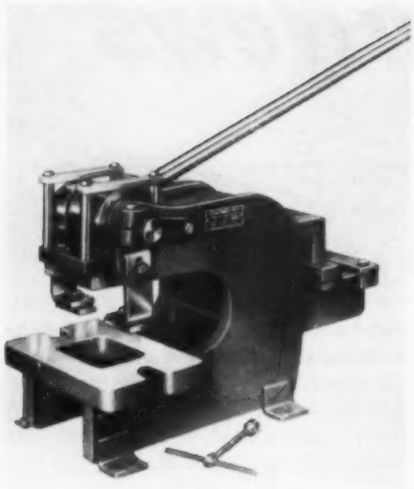


DoAll Variable-Speed Die Filer Saws and Hones Many Materials

A variable-speed precision die filer, All American Model 1500-S, is manufactured by the All American Tool & Mfg. Co., Chicago, Ill., and offered by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.

Stepless speeds from 170 to 470 strokes per min. are possible using the DoAll Speedmaster, Model No. 3A. Machine can be used for filing, sawing, or honing, in a range of materials. Slow speeds are required for filing and sawing high-chrome steels, medium speeds for general-purpose work, and high speeds for honing. Files are available in 12 different shapes, three grades of coarseness, and two shank sizes with corresponding cross-section sizes.

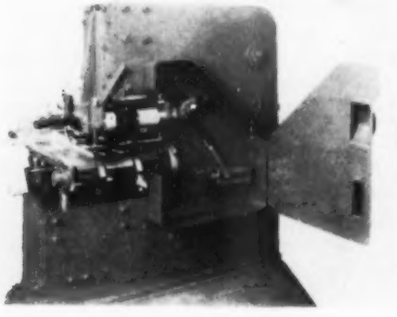
The two-power magnifier is equipped with twin lamps to provide illumination for exacting work. The table is 10⅜ in. square, the stroke is 1½ in. A universal-joint file clamp assures vertical file position.



Redesigned Model A Punch Press Offers Positive Die Alignment

The improved Model A hand punch press is offered by The Leslie Welding Co., Dept. 00, 2943 Carroll Ave., Chicago 12, Ill. Press has no ram, ways, or slides, yet is said to have the accuracy of a leader-pin die set. Press is especially adapted to blanking operations on sheets of any type material. Positive die alignment is maintained by the aligning leaf assembly, to which the punch is fastened at one end.

Designed to accommodate most blanking punches ordinarily used on small power presses, the punch plate is 4 in., front to back, and 4⅜ in., right to left. The press has a throat depth of 6 in., and a stroke of 7/16 in., with an adjustment of ⅛ in. The capacity of the press is a 3-in. dia. hole through 16-gage mild steel or a 2-in. dia. hole through 12-gage mild steel. The hole in bed is 3⅛ x 4½ in.

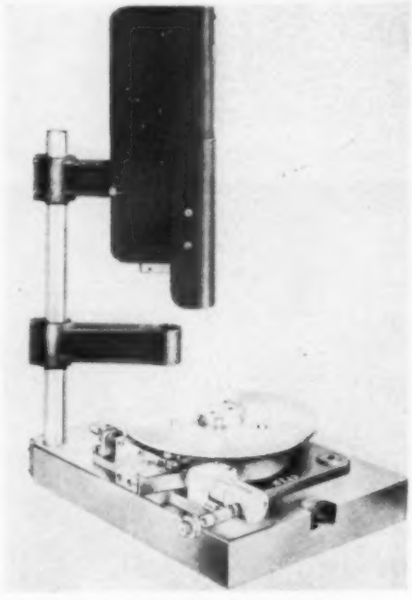


Model AH Roll-Leaf Stamping Press Marks Varied Types of Materials

A roll-leaf hot stamping press is marketed by Peerless Roll Leaf Co., Inc., Union City, N. J. Listed as the Model AH, it is built exclusively for roll-leaf stamping. Stamping speeds range from 10 to 60 impressions per min. Stamping heats and pressures, length of dwell, methods of feeding the work to the press and ejecting the finished work have been taken into consideration.

Over-all size of the machine is 2 ft. 7 in.x3 ft. 9 in.x5 ft. Depth of throat opening is 10 in. from front of head to center of chase. A dial records the degree of pressure adjustment.

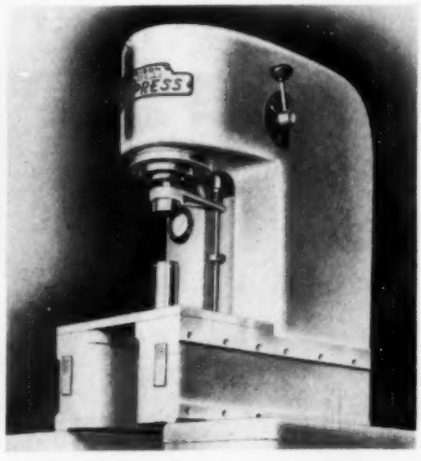
The head and die plate are each 6x7 in. The inside chase is 5x6 in. The dial table is 16 in. in diameter, and has eight stations, with adjustment so that the dial will move in 45°, 90°, or 180° arcs. The operator can adjust pull of leaf in 1/16-in. increments up to a length equivalent to the width of the stamping head.



Mead's Impact Hammer, Air Press Offered with Rotary Work Feeders

Mead Specialties Co., Dept. HP-4, 4114 N. Knox Ave., Chicago 41, Ill., offers an air press and rotary work feeder with a universal base. The press with various accessories can be used for light staking, forming, pressing, and assembly operations. The heavy cast-iron vertical stand is accurately machined to give perpendicularity between ram and table.

Also offered is the Mead impact hammer and rotary feeder with a universal base, illustrated. The heavy-duty cast iron base is 12x17x2 in., and weighs 70 lb. The hammer is actuated by the auxiliary valve on the left side of the rotary work feeder. The valve opens at the moment the dial locks in position. It closes as soon as the indexing pawl starts back for a new station giving the hammer time to reset for the next blow. The combination is capable of cycles up to 5000 per hr Base can be mounted on a shop bench.



Four-Ton Capacity Multipress Offers 450-ipm. Pressing Speed

The Rocket Multipress offers speeds of 1100-ipm. approach speed, 450-ipm. pressing speed and 750-ipm. return speed. Three major design changes have been announced: one in the control system, one in the operating component, and one in the power system. Made by The Denison Engineering Co., 1160 Dublin Rd., Columbus 16, Ohio, the Rocket Multipress is especially suited to high-speed applications. HydrOILic power is incorporated.

LIVE, AND SEMI-LIVE SKIDS can be handled by a special Transtractor, made by Automatic Transportation Co., 149 West 87th St., Chicago, Ill. Full driving traction when lifting heavy loads is provided. Also offered is maneuverability virtually equal to that of a hand-lift jack, and a capacity to handle skid loads of almost any size

Lodge & Shipley Lathes *at work...*

Tip Top PRODUCTS COMPANY
OMAHA, NEBRASKA

OF SPECIAL INTEREST IS THE LODGE & SHIPLEY UNIVERSAL RELIEVING ATTACHMENT SHOWN ON THE REAR OF THIS LATHE.

1. This manufacturer finds the universal relieving attachment highly useful for occasional requirements, yet there is no interference with normal high powered work.
2. The universal relieving attachment can be used for straight or form relieving on a diameter, internal, end or angular relieving.
3. Since it is in the rear it is out of the operator's way. (Note how close operator can come to his work.)
4. The lathe can be used for the regular jobs without any alteration or replacement of top slide or cross slide (because the universal relieving attachment is simply disengaged at the headstock end when it is not required).

This manufacturer found that the Lodge & Shipley 16-inch Model "A" saves more than a third on time, since it is "able to take a heavier cut." Because of the greater rigidity and horsepower of these lathes you, too, can obtain equally excellent results.

This manufacturer states output is "very satisfactory" and accuracy is "excellent." In machining parts for punch press dies and injection molds, tough steels are used . . . the owner reports, "we think it is the best lathe on the market for sturdiness and accuracy."

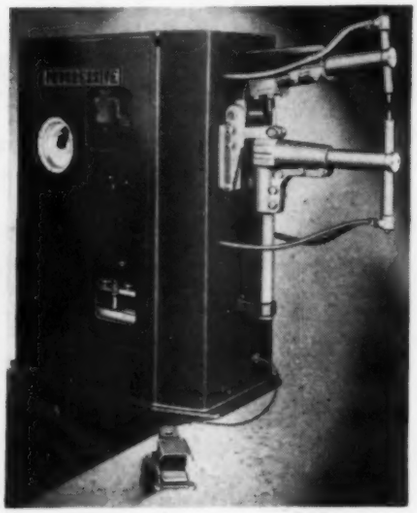
Designed for strength and with power to spare, Lodge & Shipley Lathes attain amazing records for production and accuracy. A Lodge & Shipley Representative will gladly show you other case histories and production data demonstrating this fact. Write for Condensed Catalog showing the complete line of Engine, Toolmaker, Manufacturing, Hollow Spindle, Duomatic (Automatic), Gap and Turret Lathes.

THE **Lodge & Shipley** COMPANY
MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

Di-Acro Double-Purpose Punch Perforates Holes to 4-in. Dia.

The O'Neil-Irwin Mfg. Co., Lake City, Minn., offers the Di-Acro double-purpose punch which can be utilized for perforating holes of various shapes and sizes to 4 in. in diameter, and also used as a precision punch press for a variety of blanking, drawing, embossing, and forming operations. Action is obtained through a roller-bearing cam.

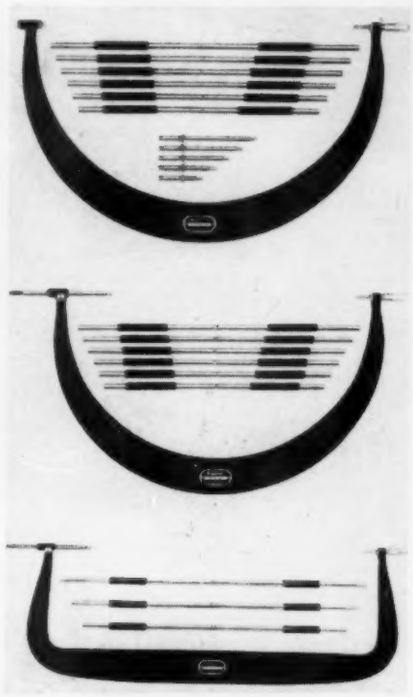
The triangular-shaped ram is hardened and precision ground. The flexble-gaging arrangement can be adjusted to provide precision location of the material for exacting operations. A variety of interchangeable punches in round, square, oval, and rectangular shapes are available. The punch will perform either primary or secondary operations on parts being processed through the Di-Acro system of die-less duplicating. The over-all bed dimensions are 6x7½ in.



Air-Operated Rocker-Arm Welders Have Capacities of 30 or 50 KVA.

A line of standard air-operated rocker-arm welders, in both 30-and 50-kva. capacities and with throat depths ranging from 18 to 36 in. for each capacity, are built by Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich.

Three independent water-cooling circuits are used for the transformer, lower arm, and upper arm. Sight gages show circulation through an opening in the side of the machine. An optional single-operating cylinder and a compound retractable-stroke cylinder are interchangeable. The high-speed air valve permits higher welding speeds.



Tubular Micrometers by Starrett Offer Hollow-Formed Steel Frames

The L . S. Starrett Co., Athol, Mass., offers a line of tubular-frame micrometers for large-capacity precision measuring. The steel frames are hollow-formed in two sections and welded to produce a flat tubular shape and are both rigid and light. The micrometers are available with bow-type (C-shaped) frames for measuring by thousandths over a 6-in. range in eight capacity ranges from 12-18 in. up to 54-60 in. Larger sizes for any range are available on special order.

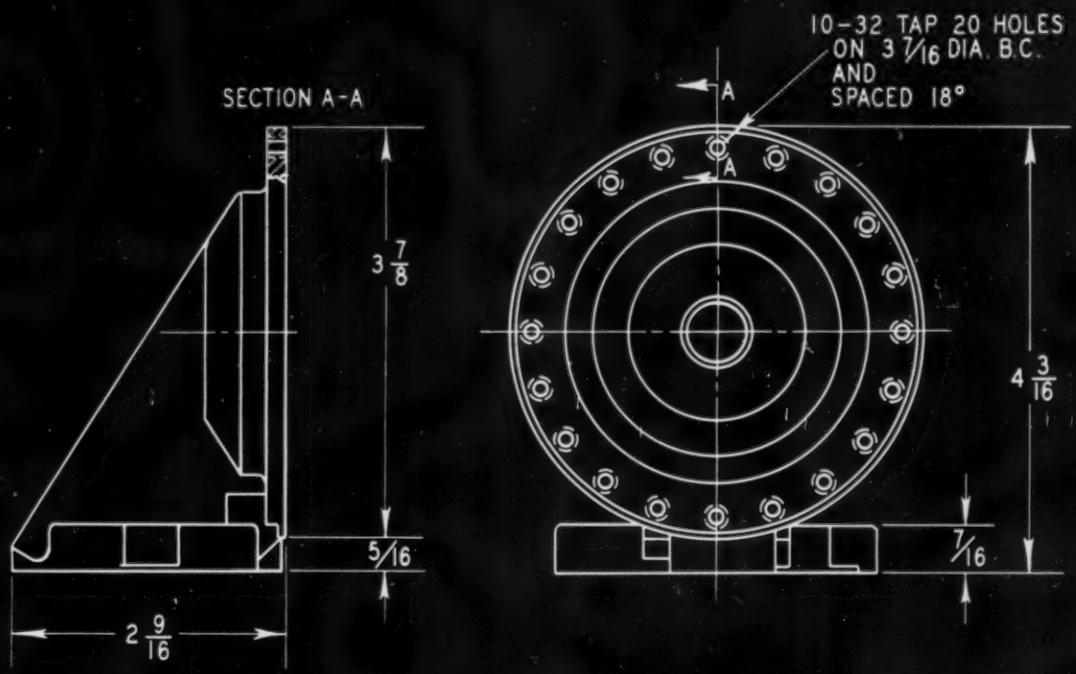
SIX-SPINDLE automatic screw machine, Model 602, is offered by New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn. Machine handles carbide tooling and has a standard capacity of 2¼ in. The six cross slides are all radial to the center line of the spindle carrier and are 60° apart, allowing the same line of forming thrust in each position and giving interchangeability of toolholders among the five heavy-duty forming slides

Harduty Carbide-Tipped Drills Offered for Hardened Die Steel

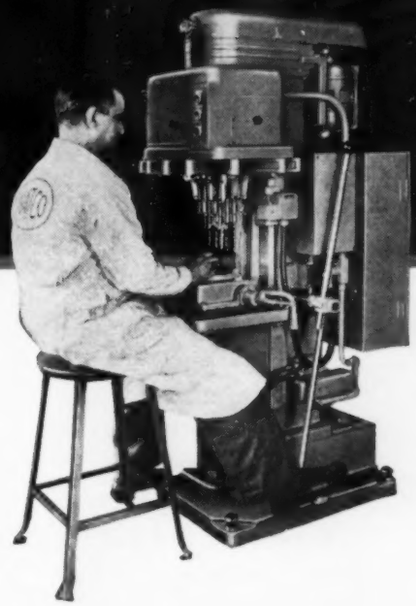
Chicago Latrobe Twist Drill Works, 411 West Ontario St., Chicago 10, Ill., offers the Harduty carbide-tipped drills, Type No. 1750, for use in hardened die steel or similar case-treated steels. Its main purpose is to enable parts to be drilled after they have been hardened without the usual annealing process or grinding method. The drills have hardened high-speed steel bodies and are offered in diameters from 3/32 to ¾ in. in 1/32-in. increments.

PRODUCTION INCREASED 100% over Previous Method

with NATCO High Speed Sensitive Drilling and Tapping Machine



Part—Die Cast Diaphragm Cover
Operations—Tap Ten 10-32 Holes
Index
Tap Ten 10-32 Holes
Production—Approximately 300 Parts Per Hour



NATCO A33 Multi-Spindle Machines are built specifically to help you obtain more economical high speed, light sensitive drilling and tapping operations in your plant. They make possible remarkably high production and low hole cost in a wide range of small and medium sized work. Whether your production involves drilling and tapping operations in cast iron, in steel, in aluminum, in plastics or in wood, NATCO welcomes your inquiry and suggests that you send prints wherever possible. Write today!

NATCO DRILLING, BORING, TAPPING AND FACING MACHINES

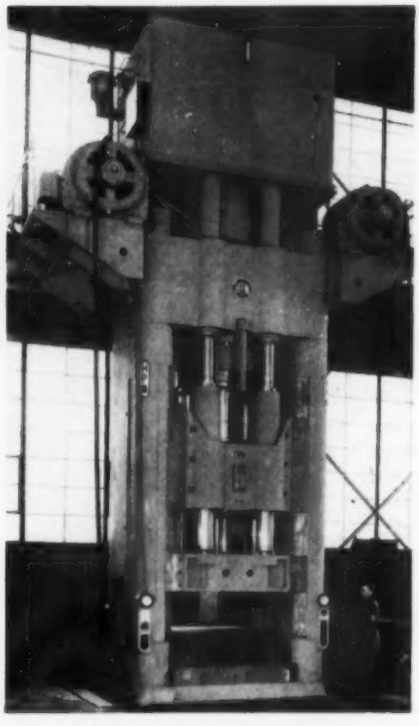
NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.

Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City

Call a Natco Field Engineer

SAW, an attachment for electric or air hand drills and flexible shafts, up to 1700 rpm., for converting standard rotary motion into reciprocating action for sawing, filing, honing, and polishing, is offered by V-W Specialists, Upper Darby, Pa. Called the Clever Saw, it is also adaptable to small bench or pedestal drills. All types of saw blades are usable from 3 to 4 in. long. It is light in weight and has a ¾-in. stroke. Working parts are inclosed in an oil chamber



Deep Sheet-Metal Drawing Press Will Draw Parts to 4 ft. Deep

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, introduces a double-action hydraulic deep sheet-metal drawing press for deep drawing long cylindrical tanks used for storing gas and liquids.

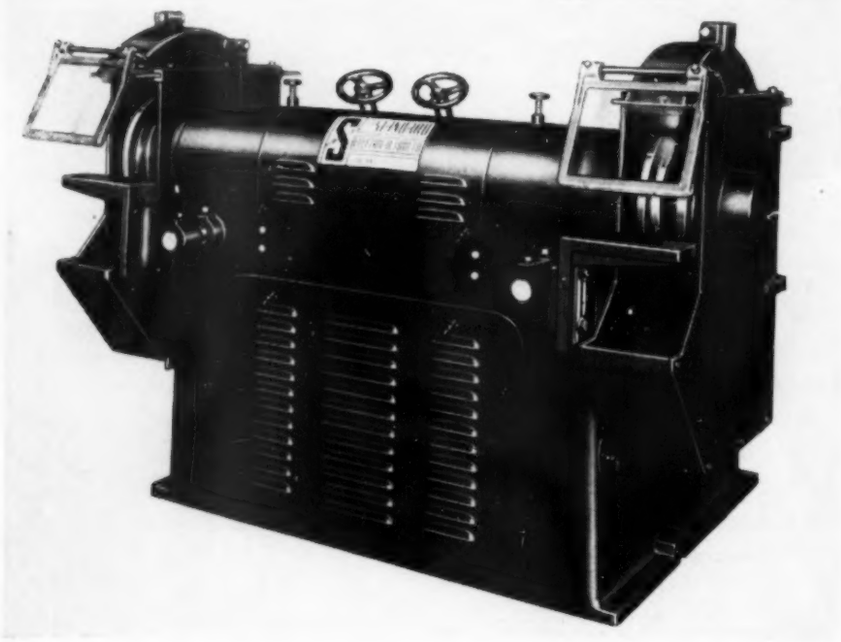
The press weighs 7 tons and is 34½ ft. high. The pressing surfaces for mounting dies are 72x72 in. The press will draw sheet-metal parts to a depth of 4 ft. An example of work scheduled is a part 36 in. in dia., and 28 in. deep which will be drawn in a single stroke from a blank 72 in. in dia.

The pressure exerted by the blankholder slide can be independently controlled at each of the four corners. The stroke of the punch-carrying slide is 72 in. Up to 1500 tons of pressure can be applied by the punch. Pressing work up to 600 tons can be accomplished with the high-speed booster ram with automatic shiftover to higher pressures when needed.

PLIERS, made by Lapeer Mfg. Co., Lapeer, Mich., offer a square-throat opening which permits thicker work to be inserted between the jaws to a greater depth. Known as the Knu-Vise plier models, the two new models offer an increased spindle diameter of ⅜ in. Model P-1200 with a throat capacity of 19/32x2¼ in., provides 1200-lb. clamping pressure; Model P-1800, with throat capacity of 19/32x1¼ in., provides 1800-lb. clamping pressure

Crane with 2000-lb. Capacity Incorporates a 45-in. Boom

The Hydro-Lift Crane is offered by Cardinal Corp., St. Paul, Minn. The crane has a 2000-lb. capacity and a 45-in. boom. An 18-in. extension arm can be attached for greater boom length. The double-acting hydraulic pump converts the movement of the pump handle into lift motion. By placing the towing handle in an upright position the brake is automatically set. The Hydro-Lift is priced at $149.50.



REDESIGNED TWIN-MOTOR variable-speed snagging grinder, No. 35, is a 2-in-1 machine, made by the Standard Electrical Tool Co., 2480 W. Sixth St., Cincinnati 4, Ohio. One side of the machine can be stationary while the other wheel is operating. It has two independent spindles and two 7½-hp. motors. The speed control is an interlock making it impossible to operate the wheels in excess of the recommended speed

BROACHING CUTS COSTS FASTER!

PIONEERS OF H.S.S. BROACHING

COLONIAL

BROACH CO. DETROIT 13

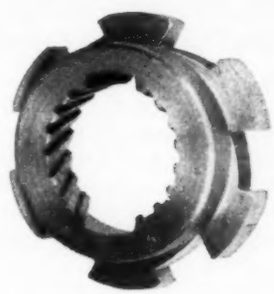
BEST BY TEST

Colonial broaches represent the fastest, surest, precision method there is for removing metal. May be used equally effectively for all kinds of internal or external shapes, regular or irregular.

Wherever they CAN be used, they are bound to give you greater output per machine hour—and that means REAL SAVINGS—savings that pay for the tooling cost in a surprisingly short time.

There's a Colonial field representative near you. Ask us to have him figure where and how much *you* can save; how much you can boost your output per machine hour.

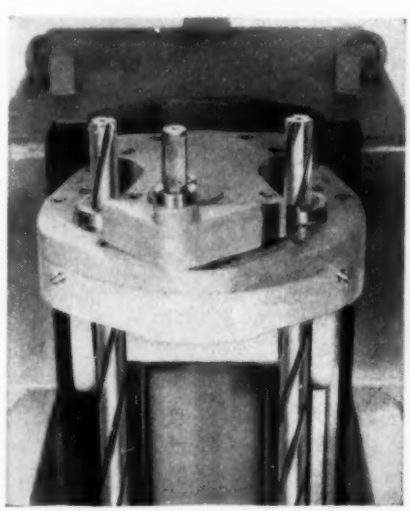
—STEEL— —BRONZE— —COPPER—



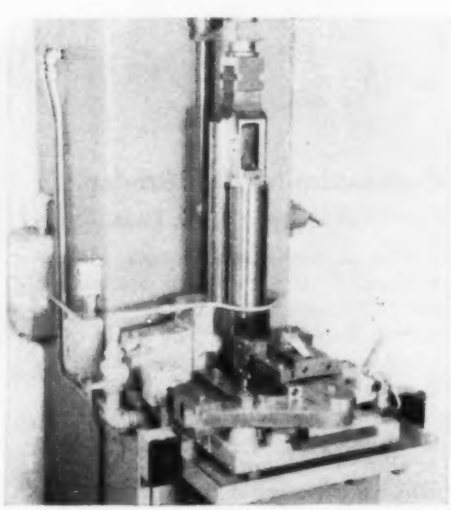
Internal Gears and Splines

Telephone Relay Parts

Electrical Breaker Arms

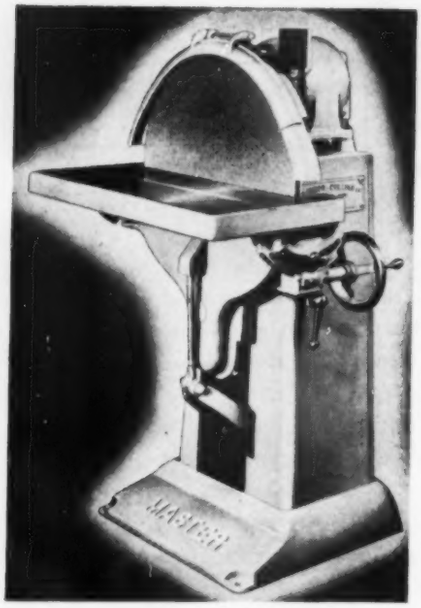


One pass of the broach and the internal gear or spline is finish-cut. Accuracy is insured by Colonial's specially developed involute and other broach checkers and grinding methods.



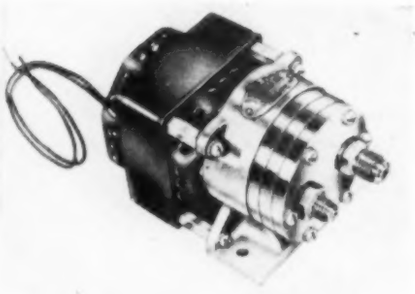
It is impossible by any other method to maintain the accuracy of the cam teeth on parts like these while getting the production obtained with Colonial Broaches (360 per hour at 85% efficiency).

800 to 1000 pieces per hour on one machine with the two sets of Colonial broaches shown here (one set also 'disassembled' to show simplicity). Parts are broached 8 at a time.

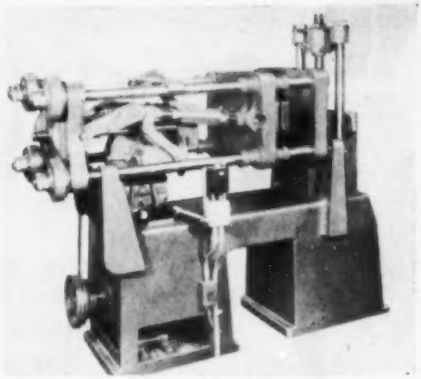


Master 24-in. Disk Grinder Offers Reversible-Type Disk

A 24-in. Master disk grinder is offered by The Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio. It is said to be vibrationless through balancing, and can be adjusted by means of a counterbalanced table which moves up or down 11 in. by hand pressure to any desired position. A reversible disk for right- or left-hand jobs is offered. A 5-in. hole in the back of the machine permits attaching to a house suction system or dust collector.



METERING PUMP unit is made by the Mechanical Products Corp., 168 North Ogden Ave., Chicago, Ill. The uniformity with which the motor-driven unit discharges the liquid is not affected by a wide change in temperature or viscosity. A check-valve arrangement is said to insure instanteous discharge of the fluid and prevent dripping of leakage when pump motor is not operating. While the standard pump has a capacity of 10 cc. per sec., it is adaptable to a wide range of output



Automatic Die-Casting Machine For Zinc, Tin, Lead Production

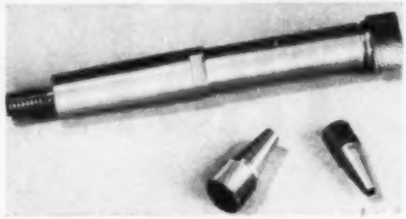
A hydraulic model of the Workhorse automatic die-casting machine is offered by Light Metal Machinery, Inc., 736 Penton Bldg., Cleveland, Ohio. Listed as No. 32 HZ, it is designed for zinc, tin, or lead production. Shot capacity is 32 oz. Top speed is 720 shots per hr.; other speeds are 520, 340, and 240. The casting cycle is automatic. A Vickers hydraulic-control unit is incorporated in the machine.

Combination Tap, Drill Grinder Will Sharpen Flute Twist Drills

A line of Grand Rapids combination tap and drill grinders is announced by Gallmeyer & Livingston Co., Grand Rapids, Mich. The Style BD-1 machine, illustrated, has a capacity for sharpening taps from No. 6 to 1½ in., and twist drills from ⅛ to 1½ in. Machines are built around a heavy one-piece column and base casting which is machined to take the greased-for-life precision ball-bearing spindle.

Either right- or left-hand 2-, 3-, and 4-flute taps can be sharpened, and the holder can be adjusted to grind blunt tapers as required for bottoming taps, or exceedingly long tapers. A diamond truing device is provided for dressing of the tap-grinding wheel.

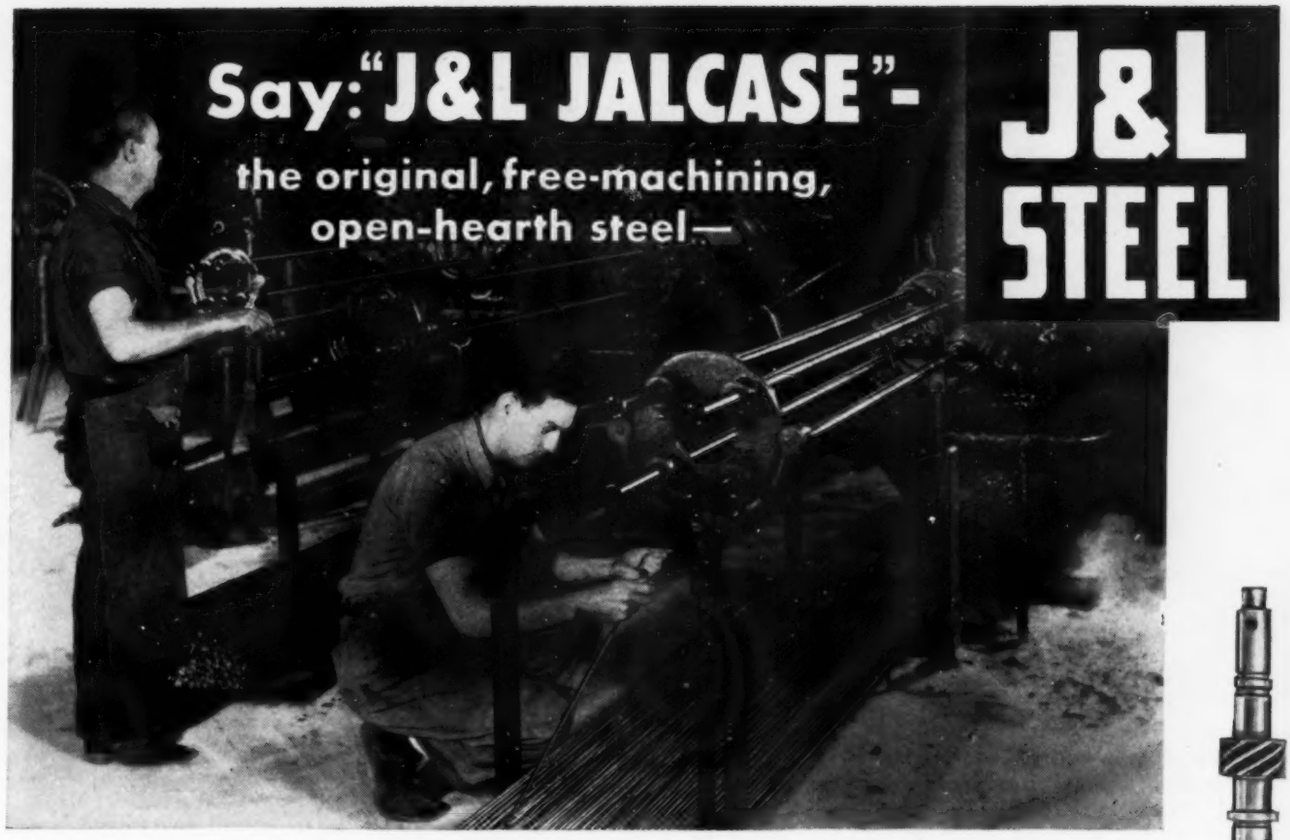
The twist-drill grinding attachment is suitable for sharpening 2-, 3-, and 4-flute twist drills of either straight-shank or taper-shank type, and the only adjustment necessary when changing from sharpening one size to another is to slide the tailstock to compensate for the difference in the length of the drills. A truing device is provided for dressing of the drill-grinding wheel.



Micro-Mills with Tapered Shanks Offered for Internal Finishing

Severance Tool Industries Inc., 726 Iowa St., Saginaw, Mich., now offers the Micro-Mills designed for speedy internal finishing, in sizes of ⅜ in. and larger having tapered shanks. Standard internal grinding spindles or quills can be adapted for mounting by mating two steep tapers and securing the Micro-Mill in place with a retaining screw. Bores can be sized in one or two passes with finishes having comparable profilometer readings. Nine standard sizes cover the range from ⅜- to 1½-in. dia.

PALLET-HANDLING TRUCK, the Truck-Man pallet toter, is offered by Truck-Man, Inc., 1424 Ganson St., Jackson, Mich. Listed as Model DF, the truck is a gasoline-powered pallet toter with a capacity of 3000 lb. The truck weighs 920 lb. Speeds in either direction are from creeping upward to 3 mph. Toter is priced complete at $850.

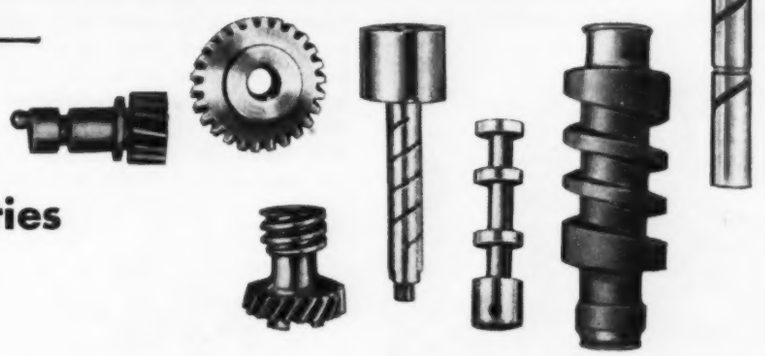


if you want the best in—

✓ machinability

✓ heat-treating properties

✓ physical properties



There's more to J&L Jalcase Steel than a grade number. That's why, if you want the best, you must specify "J&L JALCASE."

- It is the *original*, free-machining, open-hearth steel.
- It still is the outstanding steel in its class today.
- Its machining properties closely approach those of Bessemer steel.
- It machines with a fine finish.
- It is easy to heat treat by conventional and high-speed induction methods.
- It lengthens tool life.
- It reduces production costs.

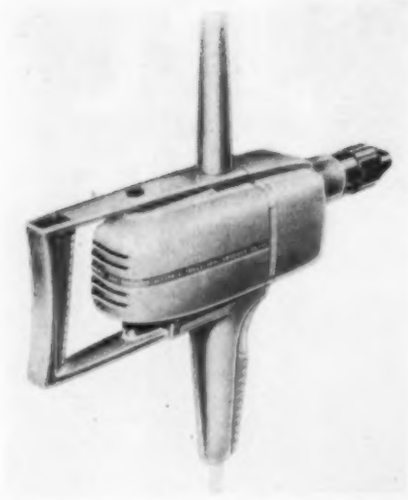
Jalcase is available in a range of grades to suit a wide variety of applications. It is supplied as cold-drawn or cold-drawn-with-metallurgical-processing, which includes special tempering treatments. Thus many parts made of this material may need no further heat treatment after machining.

Typical Jalcase analyses are found in the A.I.S.I. 1100 series wherein the manganese content is 1.00% to 1.65%, such as in Grades C-1117 through C-1144.

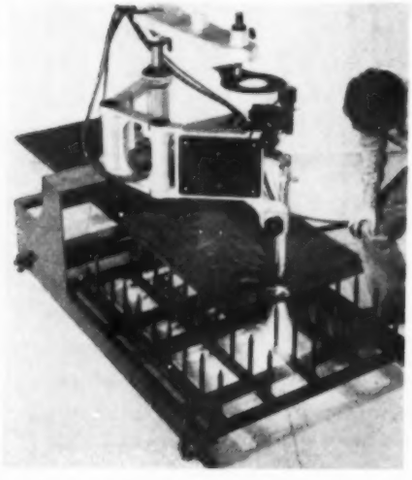
Let us send you complete information on J&L Jalcase—the *modern* free-cutting steel. Write to: Jones & Laughlin Steel Corporation, 402 Jones & Laughlin Building, Pittsburgh 30, Pa.

JONES & LAUGHLIN STEEL CORPORATION

AMERICA'S FOREMOST PRODUCER OF FREE-CUTTING, QUALITY-CONTROLLED STEELS



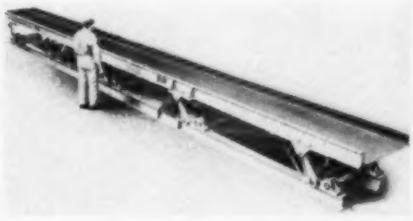
PORTABLE ELECTRIC DRILL is introduced by Portable Electric Tools, Inc., 255-59 West 79th St., Chicago 20, Ill. Listed as Model 500, the drill offers a ½-in. capacity. A balanced armature, housing, and handles of lightweight aluminum alloy, removable side handles for close-quarter drilling, and a blower-type fan for cooling, are featured. It has a no-load speed of 400 rpm., and a full-load speed of 240 rpm. Capacity in steel is ½ in.



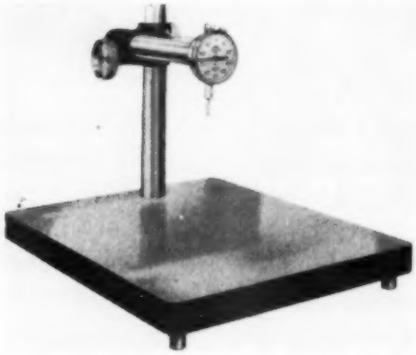
SC-42 Flame-Cutting Machine Cuts a 42-in. Diameter Circle

The Model SC-42 flame-cutting machine is offered by Ohmstede Machine Works, Beaumont, Tex. The machine comes equipped with a production-type base. It can be set up for cutting a few parts by using a templet made of plywood, or if production cutting is required, a steel templet can be made by cutting such a templet from a plywood templet. The machine using magnetic tracing will cut an unlimited variety of shapes. Straight-line cutting is accomplished by running the tracing roller along a straight bar.

The speed can be varied from 3 to 30 ipm., and by using different sizes of tracing rollers, this range can either be decreased or increased. Both spindle and magnetic tracing are offered. The SC-42 will cut a 42-in. dia. circle and a straight line of 89 in. Maximum thickness of a cut with a standard blowpipe is 8 in. Machine's over-all dimensions are 36x72x59 in.

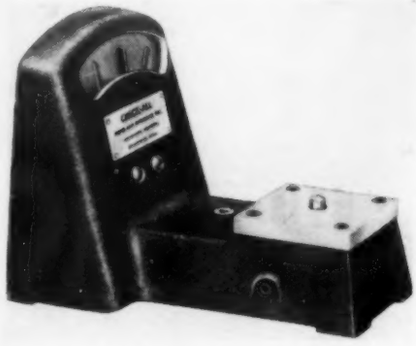


OSCILLATING FEEDER AND CONVEYOR, for handling materials in a horizontal path, is offered by Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill. The PA conveyor is an eccentric-type oscillating-trough feeder-conveyor, driven by a Link-Belt Electro-fluid drive. It is available in standard trough widths of 12 to 48 in. in single trough lengths of up to 100 ft. Trough is either pan type or constructed with channel-steel sides. It can be furnished with dust-tight covers or constructed for air- and gas-tight movement of material



Heavy-Duty Dial Comparator Checks Large-Diameter Shafts

A heavy-duty dial comparator, the No. 130, is announced by B. C. Ames Co., Waltham 54, Mass. The No. 130 can be used to check heavy parts, such as large-diameter shafts, and solid blocks having large cross-sections. The base is solid 1-in.-thick steel. The indicator usually furnished is Ames Model No. 202 with lift lever; dial graduated 0.001 in., dial reading 0-100, and a 0.250 indicator range, although any size or range Ames Hundred Series indicator can be supplied. The base is available in any size, such as 10x10 in., or 10x14 in. The upright post can be furnished in any desired height.

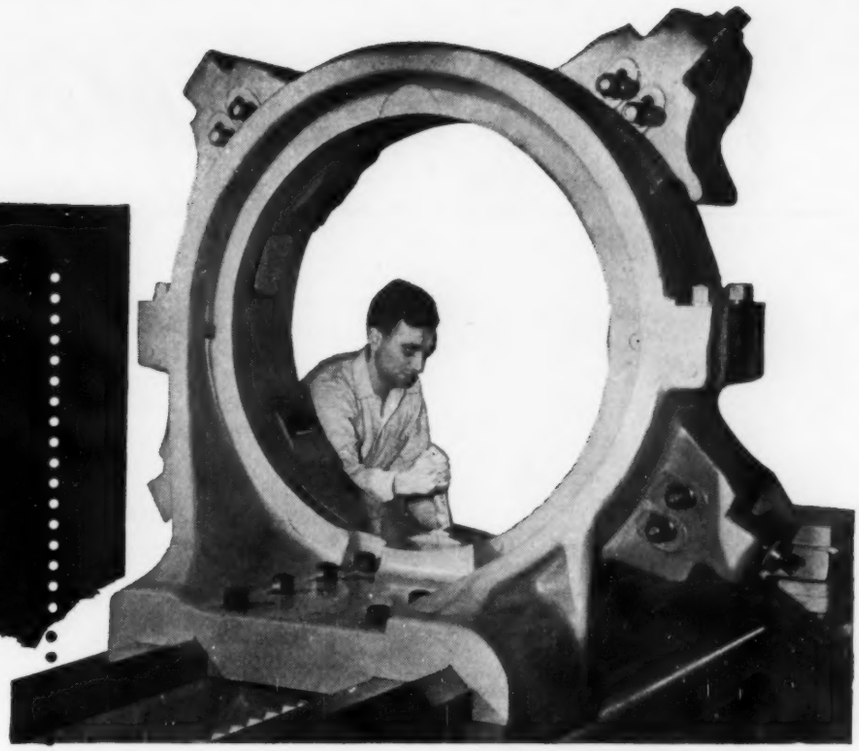


Universal Production-Type Gage Checks to ±0.010-in. Tolerance

A universal production gage is offered by Roper & Broderick, Inc., 1694 Main St., Springfield, Mass. Called the Check-all gage, it gives a multiplication of approximately 200 to 1 and will check up to ±0.010-in. tolerance. It is a comparator gage, and has a standard hardened-steel drill bushing used to guide the gage pin which is replaceable in case of wear. The gage is priced at $39.50.

GRINDER, for grinding points on flat beaded drills which are used for very tough metals, is offered by the Hisey-Wolf Machine Co., Cincinnati 25, Ohio. The holder on the left side of the machine grinds the point while the holder on the right side is used for thinning the web. Machine will handle flat drills from ½- to 2-in. dia. A point-grinding attachment on the left end will also grind ordinary twist drills from ¼- to 2½-in. dia.

BIG PRODUCER



How do you handle machining of outsize, irregular parts?

Here's a way that may save you time . . . and money. Hold the part in a fixture or cradle, and turn it on a Monarch; you'll get peak production *at a profit.*

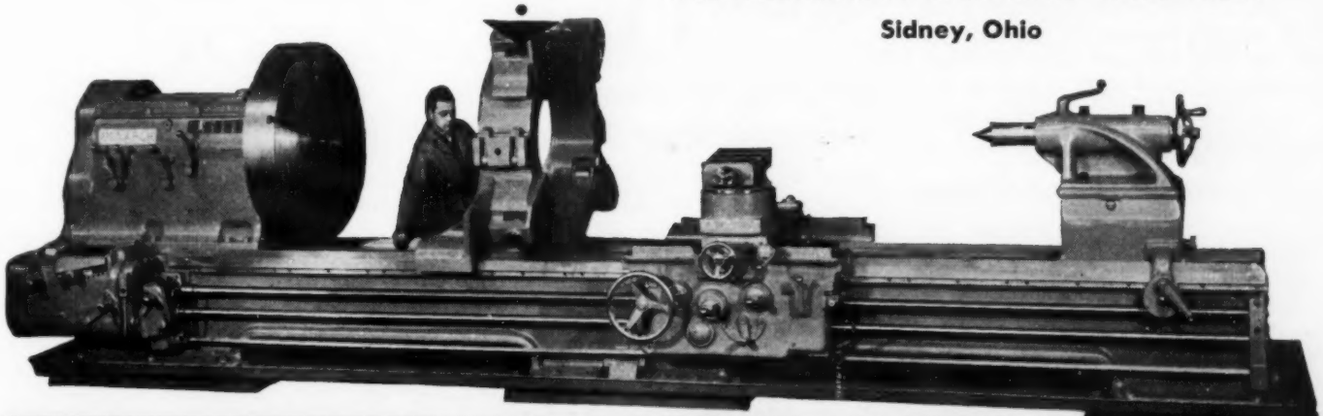
For example, for one customer we've raised a 32″ x 180″ Model NN Engine Lathe in the sand, to swing 48″ over the bed and 36½″ over the cross slide, as illustrated. There's ample power for the turning and boring operations, yet no idle investment in ponderous, unused capacity. The antifriction, steady rest provides 36″ to 38½″ capacity—more than enough to handle a variety of jigs and fixtures. The result is a simple solution to this customer's bothersome production problem. May we help you, too?

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

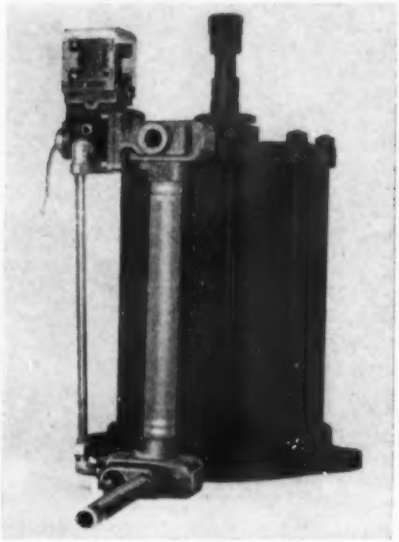
THE MONARCH MACHINE TOOL CO.

Sidney, Ohio



FOR A GOOD TURN *FASTER*—TURN TO MONARCH

Parts and Materials



3-Way Valve Air-Cylinder Control Applied Directly to Cylinder Head

Individual-control units for control of air cylinders is offered by Numatics of Milford, Mich. Units are applied directly to the cylinder heads. The control units are full-capacity 3-way valves and are screwed directly into the pipe connections of any air cylinder. Users can select their own control for solenoid, combinations of double-solenoid, hand, foot, cam, or sequence operation, of either old or new cylinders.

Control can be at the cylinder or from a remote location using ¼-in. tubing or hose from the operating station. Speed can also be controlled by throttling at the individual exhausts. The Numatics units are available in pipe sizes, of ½, ¾, and 1 in. An 8x10-in. cylinder with ¾-in. connections is illustrated.

Water-Soluble Cutting Oil Remains Clear at All Times

A cutting oil, said to eliminate further rust-prevention treatment for tools, materials, and machinery, is offered by Beacon Rust Proofing Co., 19 West 31st St., New York, N. Y. Called Ferox, it is used one to 40 parts of clear water for most metals. For use on cast iron and malleable iron, one part Ferox is used with 33 parts of clear water. For threading or polishing operations, one part of Ferox is used with 35 parts of clear water.

The solution remains completely clear at all times. It is sold in 5-gal. cans and 55-gal. drums.

Ampco Aluminum-Bronze Alloy For Forming, Drawing Dies

An aluminum-bronze alloy for use in forming and drawing dies is offered by Ampco Metal, Inc., Milwaukee 4, Wis. Listed as Ampco Metal Grade 24, the alloy is said to possess hardness coupled with high compressive strength and wear-resistance. The material is claimed to have from two to five times the life of other bronze dies before redressing and many times the life of steel dies.

Self-Starting Synchronous Motor For Constant-Speed Applications

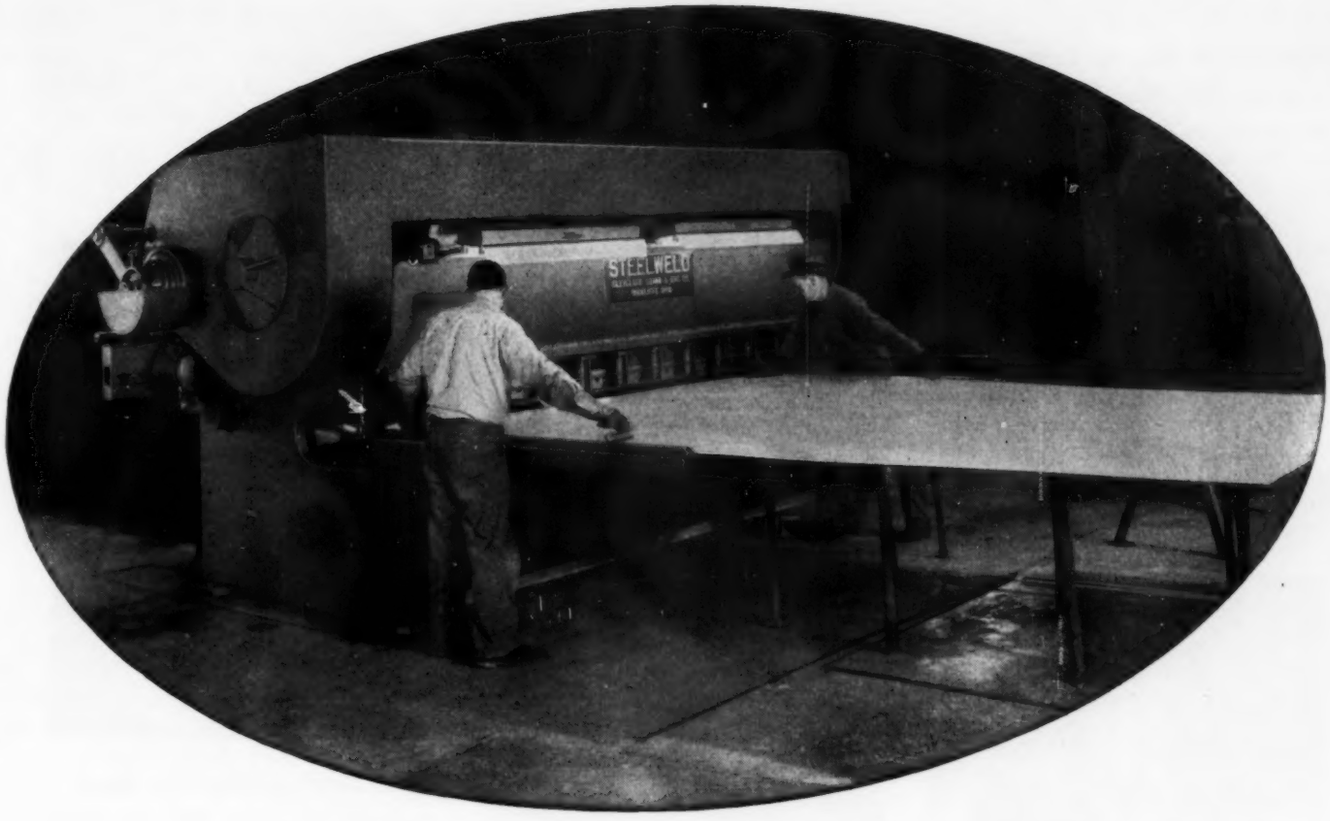
Type SX self-starting synchronous motor, marketed by The R. W. Cramer Co., Inc., Centerbrook, Conn., is redesigned to make the motor assembly, without gear train, self-contained. The design permits closer tolerance, control, and inspection of the rotor and field structure. The machine develops high torque. It is designed for use with timing devices, recording and communications equipment, and many other applications requiring constant speed at a given frequency.

The motor reaches synchronous speed within ½ to 2 cycles and will stop within one pole of motion on the 240-rpm. rotor shaft (¼ sec.) when de-energized. Standard gear trains, ranging in speeds from 60 rpm. to one revolution in 24 hr. are available, adapting motors to a variety of applications. The Type SX measures 2⅜ x 2⅛ x 1½ in., and produces a torque of 30 oz. in. at 1 rpm., 60 cycles, for speeds lower than 10 rpm., or 20 oz. in. at 1 rpm., 60 cycles, for speeds 10 rpm. or faster.

Burg's Releasing Tap Holder For Tapping on Turret Lathes

The redesigned Tool-Flex Neoprene-mounted releasing tap holder is offered for tapping on turret lathes, drillpresses, screw machines, and engine lathes. Blind-hole tapping, or tapping to a definite stop, can be done by setting the turret to a travel. The holder then permits the tap to spin freely with the spindle. When the spindle is reversed, the holder locks the tap and backs it out of the piece.

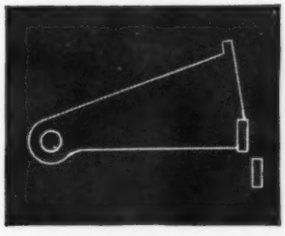
The end play provided in the holder prevents tearing of threads when backing out. The Neoprene mounting absorbs shock, keeps tap on center, and permits them to follow the original hole preventing tap breakage due to misalignment and shock.



PIVOTED-BLADE MAKES SHEARING

Fast . . Easy . . Accurate

Because of the pivoted-blade design, Steelweld Shears have several outstanding advantages heretofore unavailable in any shears at any price, which make shearing fast, easy, accurate:



EASY KNIFE ADJUSTMENT

A direct result of this design is the easy knife adjustment it makes possible. Knife clearance is quickly made to suit every plate thickness by simply turning a crank until pointer in an indicator is set for the metal to be cut. No bolts to loosen; no parts to move.

ELECTRIC FOOT CONTROL

The pivoted-blade design made the application of electric foot control a "natural." In fact it costs no more than the old-fashioned fatiguing mechanical foot treadle. For this reason it has been adopted as standard on all Steelweld Shears.

ALL-WELDED ONE-PIECE FRAME

Only because of the pivoted-blade design, was it possible to weld all parts of the frame into one solid integral unit. As there is no need of moving the bed to adjust for knife clearance, it, too, is welded permanently to the end housings. Since there are no bolted connections to loosen and misalign, deflections are minimized and long-time accuracy assured.

MANY MORE IMPORTANT FEATURES

These are a few of the features. There are many more. When you get the facts you will agree that no other shears compare with Steelwelds.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

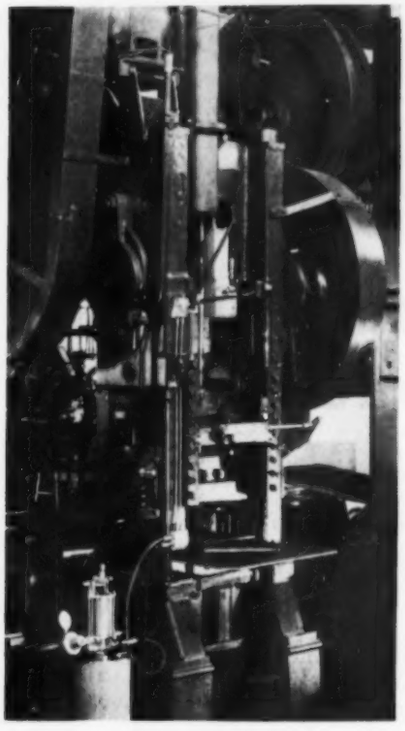
1413 EAST 282nd ST. *WICKLIFFE, OHIO*

STEELWELD PIVOTED BLADE **SHEARS**

Metal-Clean No. 16 Cutting Fluid For Ferrous, Non-Ferrous Metals

A high-grade cutting fluid is offered by The Metal-Clean Solvent Corp., 1935 N. Paulina St., Chicago, Ill. Listed as No. 16, it incorporates super-fatted materials compounded under laboratory control, and offers cooling, lubricating, wetting, and rust-prevention properties.

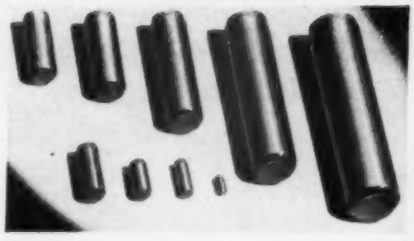
No. 16 is recommended as a coolant and lubricant for all types of ferrous and non-ferrous metals. It is said to possess an adhesive quality which prevents chip clinging. The coolant will not separate out of solution. It is said not to turn rancid or give off unpleasant odors.



Hydro-Pneumatic Overload Pitman Stops Press in Event of Overload

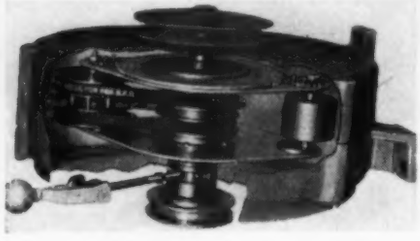
A hydro-pneumatic overload punch-press pitman with an automatic cut-out, which will automatically stop the press in event of overload, is offered by Dayton Rogers Mfg. Co., Minneapolis, Minn. The overload pitman protects the press frame and crank, as well as the tools, and is also arranged to automatically disengage the punch-press clutch mechanism as soon as the overload occurs.

It can be applied to high-speed production work where the press is traveling at 500 to 1000 strokes per min., and where ejection mechanisms or synchronized pull feeds are used on high-speed production.



Holo-Krome Steel Dowel Pins Offer Rust-Resistant Finish

The Holo-Krome Screw Corp., Hartford, Conn., offers Holo-Krome dowel pins, with a rust-resistant black-luster finish. The finish is said to act as a lubricant, and retards corrosion and prevents rusting. Made of a special-analysis alloy steel, the pins are hardened, carburized, and precision ground.



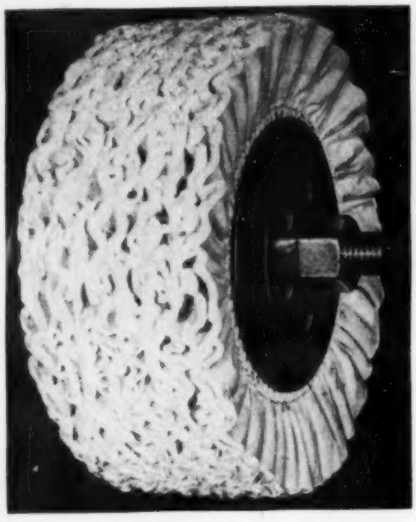
5-Hp. Control by Speed Selector Offers Speeds from 0 to 800 rpm.

A 5-hp. speed control is marketed by Speed Selector Inc., 118 Noble Court, Cleveland 13, Ohio. The variable-speed drive utilizes a principle of planetary motion applied to speed changers, making possible infinite ratio, and split-second control of speeds from 0 to 800 rpm., and into reverse where needed. Its design eliminates gear shifts, clutches, multi-speed motors, step pulleys, and other complicated devices.

Colonial Alloys Improved Process For Anodizing of Aluminum Rivets

Colonial Alloys Co., Ridge Ave., & Crawford St., Philadelphia 29, Pa., offers an improved process for anodizing and coloring aluminum rivets, screws, and similar items. The method is said to be of special use where the heads of the rivets are decorative.

An application of this method is in combination with chemical-polishing. During the brightening operation, burrs and rough surface conditions usually are removed. After the chemical-polishing treatment, the rivets are subjected to anodizing. The protective, non-smutting coating is said to be hard, and abrasion and corrosion resistant. It is said not to peel or craze.



Airway Ventilated Contact Wheel For Contour or Flat Polishing

An Airway ventilated contact wheel for abrasive-belt polishing has been developed by the Jackson Buff Corp., Long Island City, N. Y. The wheel is designed for contour or flat work on stainless- or carbon-steel stampings, aluminum, brass, die-castings, and forgings, and is applicable for high-speed contour polishing of plastics, and wood. Wheels are available in 6- to 16-in. dia. in standard sections of ½-in. face.

Durametallic's Type P.S. Seal Will Take Pressures to 600 Lb.

Dura Seal, Type P.S., is offered by Durametallic Corp., 2104 Factory St., Kalamazoo 24F, Mich. The high-pressure non-lubricated sealing can be used for light hydrocarbons in the 600-lb. pressure range. No added lubricating system is needed. Type P.S. can be installed on practically any type of pump, mixer, or like equipment having a rotating shaft. No special sleeves are required. It can be used on either motor or turbine-driven equipment. Temperatures to 250 F. can be handled. The sealing rotates with the shaft eliminating wear on shaft or sleeve. It can be installed in stuffing boxes on new or old equipment and requires ½-in. packing space. The gland which holds the insert has a fluid channel for cooling the insert.

For Versatile
PULLING, PRESSING
or LIFTING POWER use a

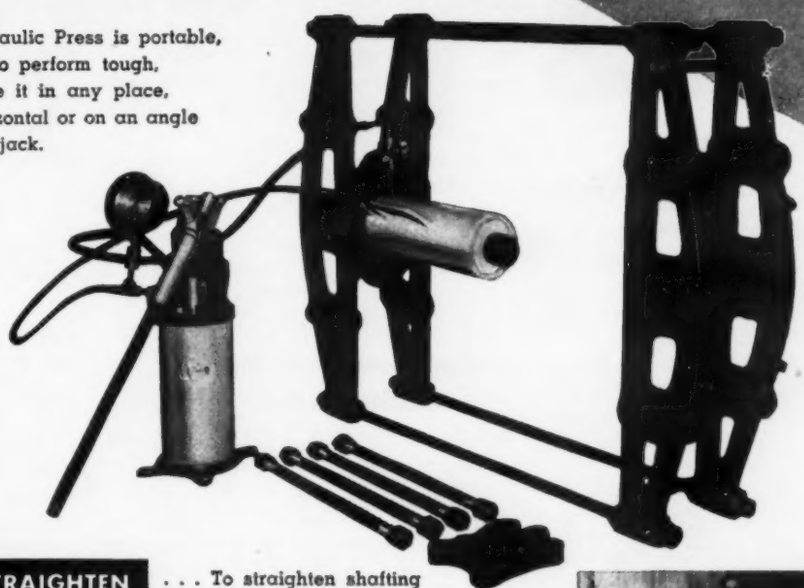
Rodgers UNIVERSAL HYDRAULIC PRESS

HYDRAULICS Rodgers KEEP THE WORLD MOVING

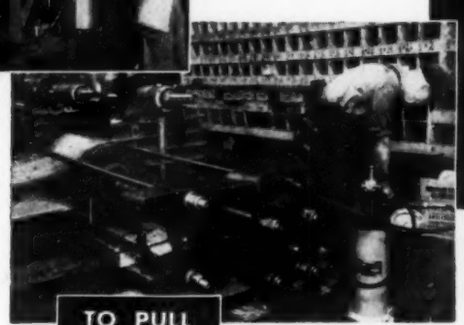
MODELS AVAILABLE IN 50, 100, 150, 200 TONS CAPACITIES

The Rodgers Universal Hydraulic Press is portable, lightweight and adjustable to perform tough, unusual jobs efficiently. Use it in any place, in any position, vertical, horizontal or on an angle to pull, press, straighten or jack. By simple high pressure hydraulics the Universal performs jobs quickly and reliably.

SEND FOR
16-page bulletin giving complete details.



TO STRAIGHTEN . . . To straighten shafting before machining, the Rodgers Universal Hydraulic Press can be mounted on a shop stand for accessibility of operator.



TO PULL . . . Here, the Rodgers Press is used to pull pitman of a rock crusher for insertion of new bearings and to assemble equipment again.

TO PRESS . . . An ideal way to press planks together with Tecco Rings, making large, heavy, rigid timbers.

TO JACK To jack pipe or concrete tile, the cylinder and pump may be removed from the press and placed in any position convenient for the operator to handle.

Shop Presses

Crawler-Track Presses

Rodgers Hydraulic, Inc.

Hydraulic Power Equipment

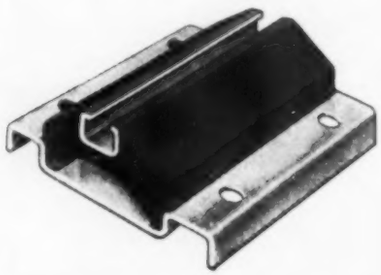
7407 WALKER ST., ST. LOUIS PARK
MINNEAPOLIS 16, MINN.

Power Pump Units

Portable Presses

Vulcanaire for Jig Grinding Grinds 1.5- to 4-in. Holes

The series 20,000 Vulcanaire developed by The Vulcan Tool Co., Dayton, Ohio, is designed for jig grinding holes in hardened steel with diameters ranging from 1½ to a maximum of 4 in. It is an air-driven attachment which can convert jig borers and other machine tools into precision jig grinders.



Mounting for Vibration Control Offered in Full Range of Sizes

The Chan-L-Mount vibration control is offered by Lord Mfg. Co., Erie, Pa. The mounting is 1½ in. high. The bolt head is inserted in either end of the metal channel which holds it while the nut is tightened. The heavy cushion of soft rubber prevents metal-to-metal bottoming. It is claimed that deflection of ¼ in. enables the mounting to isolate frequencies as low as 600 cpm., in addition to all higher frequencies.

Nickel-, Chrome-Plated Aluminum Offered in Sizes to 36x96 in.

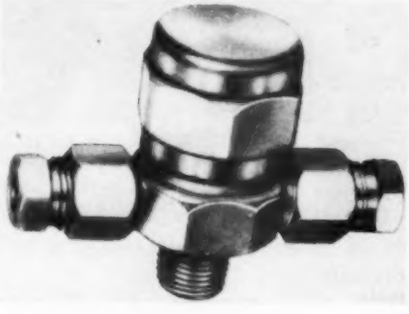
American Nickeloid Co., Peru, Ill., announces the reappearance of nickel- and chrome-plated aluminum sheet in its line of pre-finished metals. The aluminum is said to be given a harder, longer-wearing finish by preplating with nickel or chromium. Soldering of the plated aluminum is possible. It is offered in sheets only, in sizes up to 36x96 in., in a range of tempers and gages.

Corrosion-Resistant Plastic Pipe Comes in Rigid, Semi-Rigid Forms

A corrosion-resistant plastic pipe is offered by United States Rubber Co., Rockefeller Center, N. Y. The pipe is made of Kralite, a blend of synthetic rubber and thermoplastic resins. It is supplied in rigid and semi-rigid forms in sizes ranging from ¼ to 2 in. O.D., and can be bent to various radii, and threaded for fittings. No metal or fabric reinforcement is used in the construction. The pipe is made by a continuous-extrusion process.

Medium-Flow Acrylic Molding Powder Has Sparkling Clarity

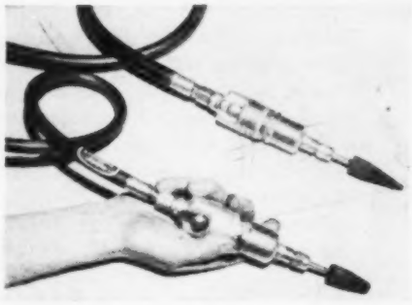
A medium-flow acrylic molding powder is announced by Rohm & Haas Co., Washington Square, Philadelphia 5, Pa. Listed as Plexiglas VM, it is an acrylic powder that is said to combine the injection-molding properties of Plexiglas F with the sparkling clarity characteristic of the heat-resistant Plexiglas V. The Rockwell Hardness (on the M Scale) is 86. Compressive strength is 15,700 psi.



Titeflex Lubricator Valve Delivers Metered Amounts

A lubricator valve that delivers a metered amount of oil or grease to each bearing in lubricating systems is offered by Titeflex, Inc., 535 Frelinghuysen Ave., Newark 5, N. J. Listed as the Grannan lubricator, it dispenses all lubricants from light oil to heavy greases. It is a hydraulic through-flow valve, and is completely inclosed.

The Grannan lubricator is installed directly into the bearing. Lubricator will function either with hand-operated guns or from an automatic system set to operate at any desired interval. Operating temperature is from 0 to 300 F. It is said to lubricate up to 500 bearings or more in less than 1 min. while the machine is in operation.



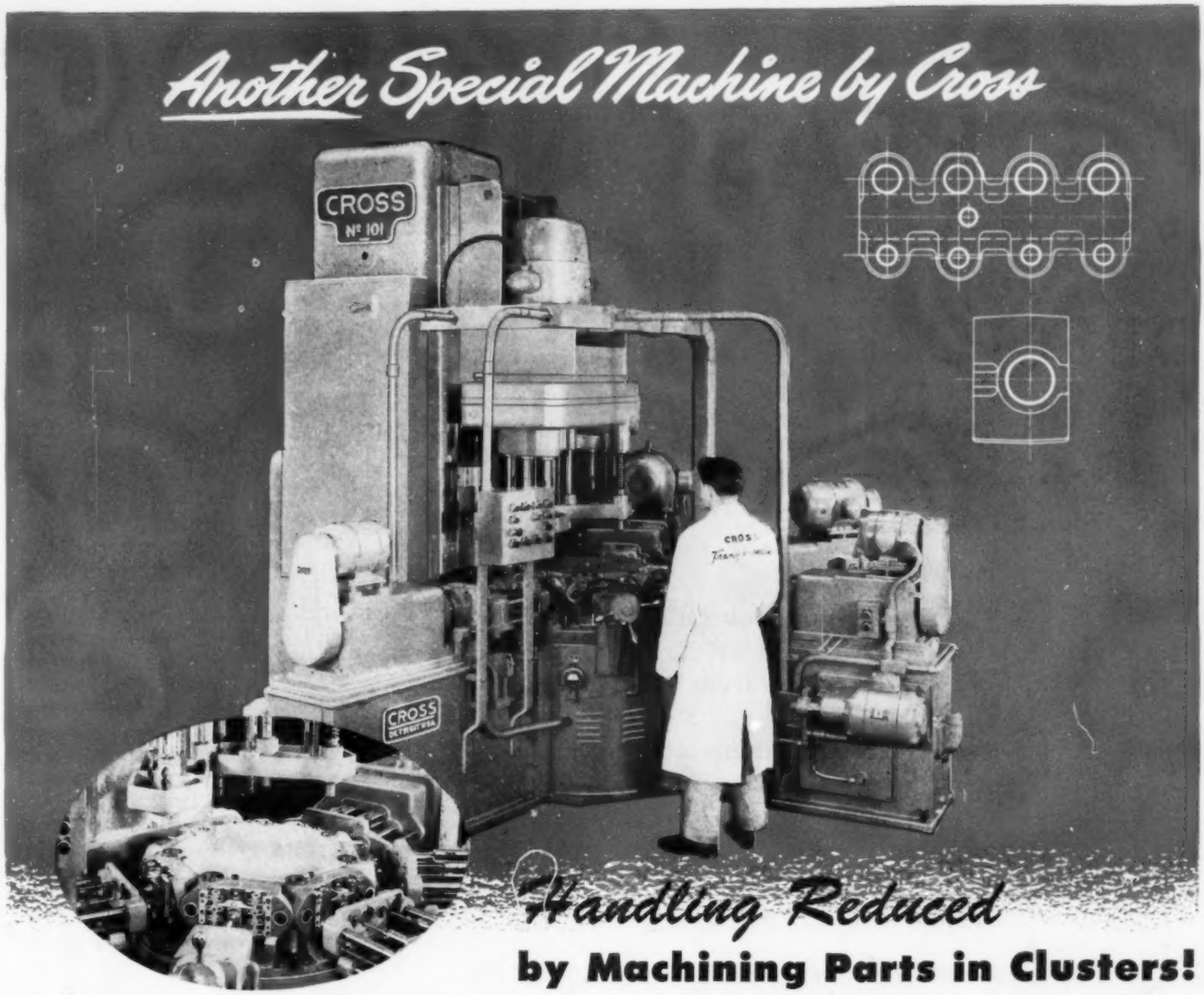
AIR HOSE for small tools is offered by The B. F. Goodrich Co., Akron, Ohio. Called Highflex, the hose is said to be as flexible as a lamp cord because of its light weight and construction features. Hose in the ¼-in. size weighs 8.8 lb. per 100 ft. The hose is not affected by lubricating oil. Working pressures to 250 psi. can be used

Erickson Large-Size Collet Chuck Takes Collets from 8 to 10 in.

The Model 1200 precision collet chuck is made by Erickson Tools Div., 2309 Hamilton Ave., Cleveland 14, Ohio, for rigidly holding larger-size workpieces. It is designed to accommodate Erickson standard precision collets over a range of 8 to 10 in., in increments of 1/32 in. The piece is gripped throughout the length of the collet instead of at one or more points.

Ramsey's Spirolox Retaining Ring Positions and Locks Moving Parts

Ramsey Corp., St. Louis, Mo., offers Spirolox retaining rings, in all sizes. Spirolox positions and locks moving parts such as pinions, bushings, and bearings, on shafts in housings, eliminating nuts, caps, and other locking and positioning parts. It is made of a flat spring-steel band, wrapped twice around itself. The retaining ring is spiraled to inside or outside grooves. A screwdriver inserted in a slot in the ring flips it out.



Handling Reduced by Machining Parts in Clusters!

How intricate production problems can be solved by combining ingenuity with experience in creating machine tools is aptly illustrated by this new special Cross machine.

Four Valve Rocker Shaft Brackets are cast in one piece for easier machining and handling. Two clusters of four parts are handled at each of the seven stations. A net total of 480 parts are drilled and reamed per hour.

This extraordinary piece of equipment again proves that one of industry's best investments today is the modern machine tool specially designed to meet specific requirements. Whether your production is large or average, it will pay you to "Consult Cross to Cut Costs."

PART: Valve Rocker Shaft Bracket.

OPERATION: Drill and ream 10 holes.

PRODUCTION 480 pieces (120 sets) per hour at 80% efficiency.

EQUIPMENT: Cross Seven-Station Combination Drilling and Reaming Machine.

FEATURES: Seven-station, power-operated index table ☆ Independent station for loading and unloading work while machine is cutting ☆ Twelve clusters machined at one time, progressively, in six working stations ☆ Flexibility for part design changes through use of standard Cross columns, heads and index table ☆ Hardened and ground steel ways ☆ Hydraulic feeds ☆ Low maintenance because of many standardized parts, accessibility of wearing parts and interchangeability of self-contained units.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

THE **CROSS** COMPANY

Established 1898

SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN

5 REASONS for using DESMOND-SIMPLEX Steel Slide Vises

1. **Exclusive Solid Steel Slide** gives greater strength, greater capacity and protects screw from dirt and damage.
2. **Removable Jaw Inserts** of hardened tool steel can be replaced quickly and easily.
3. **One-Piece Non-Pinching Handle** makes the vise safer to use.
4. **New Type Nut** with two point bearing increases gripping power tremendously.
5. **Outside Retainer** makes screw easy to lubricate.

Write now for additional details on this complete *line of vises.*

THE DESMOND-STEPHAN MFG. COMPANY • URBANA, OHIO

Desmond

SIMPLEX STEEL SLIDE VISES

BALL BEARING DRESSERS | REVOLVING CUTTER TYPE DRESSERS | DIAMOND HAND TOOLS AND NIBS | WHEEL TYPE DRESSERS | SIMPLEX STEEL-SLIDE VISES

ROUND TABLE Discussion

DOES A RAISE RAISE OUTPUT?

The promise of an individual raise may induce a temporary increase in output, but the tendency will be to fall back to the old tempo. The man in the shop is prone to think that he is never fully paid for his labor and must fight for any raise he gets, whether as an individual or as one of a crowd, and that a raise is but an installment towards the big debt which the boss owes him.

A general attitude is that the boss pays no higher wages than he can help; therefore, the men will produce the minimum that is likely to be accepted. In many shops there is an unwritten low-output standard, and to improve on this is considered dangerous to the continued employment of the men as a group.

The ruling thought should be that what is best for the industry is also the best for the employee. It is wise for a firm to take practical steps to demonstrate and make clear this fact to its personnel. If all work done were evaluated on a time or money basis and compared with a fixed and accepted measure of output, the result of this comparison could be a controlling factor in any extra remuneration. A definite system of payment by results is desirable. The basis of job rates would be proved data, and all the savings made could be paid to the workmen. Big earnings indicate big output, and thus the aims of employer and employee are unified.

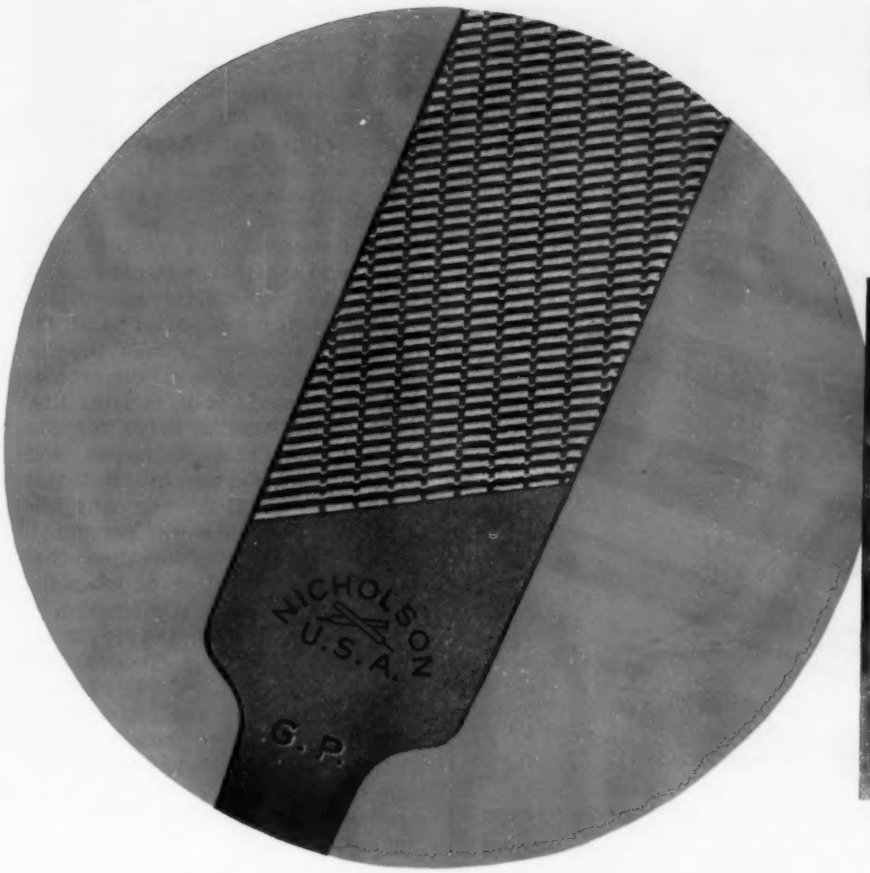
Increased output means lower costs and increased earnings.

J. E. Powell
Lincoln, England

•

One way to insure job satisfaction is to employ workers who want to do the particular work one has to offer. Where labor is plentiful, this can be arranged without difficulty. A good personnel officer can do much to ensure that those engaged are at least interested in the type of job to be filled; it then lies with the production executives to see that interest is maintained, and if possible, increased by agreeable working conditions, and to let the worker know that the company is especially interested in his future prospects.

One young man, who after several unsatisfactory jobs, found his niche



CUTS FASTER
THAN A SINGLE CUT

FINISHES SMOOTHER
THAN A DOUBLE CUT

NEW! NICHOLSON G. P. MACHINIST'S FILE

The "happy medium" in general purpose files

TWO FILES IN ONE? Well, almost. This latest development in Nicholson file designing utilizes the fundamental principles of the regular Mill (single cut) and the regular Flat (double cut) files. . . . And combines them to give *metal-removing speed* with *smooth finish.*

The Nicholson G.P. (General Purpose) Machinist's File is not intended to supplant regular or special purpose files which are designed to do some single thing in the very best manner or the shortest possible time. But to the mechanic working on ALUMINUM, BRONZE, CAST IRON, MALLEABLE IRON, MILD STEELS, or ANNEALED TOOL STEELS, it is *the* general purpose file for hundreds of fabricating and machine-shop jobs. It is a thoroughly tested-and-proved file for saving time and increasing production.

Construction. The Nicholson G.P. Machinist's File (also made in Black Diamond brand) has the shape of a regular Flat file — except that it does not taper in thickness. It comes in 8", 10", 12" and 14" lengths. The teeth are single cut (like a regular Mill Bastard file), but are divided by angular serrations. These produce shorter cutting *edges,* break up the filings — help remove stock rapidly and still leave a smooth finish.

• Try this unusual file without delay. Place a trial order with your industrial distributor at once.

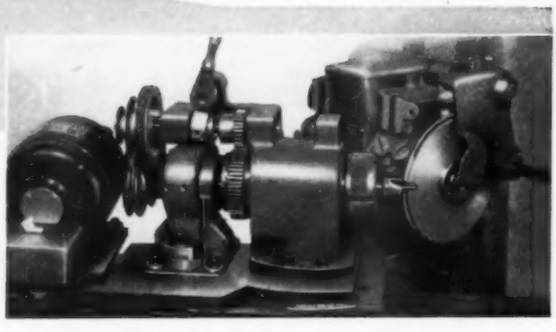
NICHOLSON U.S.A. **NICHOLSON FILE CO. • 29 ACORN STREET • PROVIDENCE 1, RHODE ISLAND**
(In Canada, Port Hope, Ont.)

NICHOLSON FILES *FOR EVERY PURPOSE*

GRIND RELIEF ON TOOLS

like these...

FASTER
EASIER
ACCURATELY



THE CIRCULARITY-GRINDING ATTACHMENT is quickly and accurately set up to grind any of the various types of relief on tools such as those shown . . . radial, form, radial and form relief combined.

No special cams or fixtures are needed for any set-up and no matter what type of relief is being ground, the tool revolves on its own axial center. The amount of relief to be ground is easily adjusted by scales provided on the attachment. All tools ground from a set-up have identical relief produced on them and by recording the scale readings, the same set-up can be made accurately time and time again.

Send for our new illustrated bulletin which gives full particulars on the set up and operation of the Circularity-Grinding Attachment.

D R & T COMPANY

DETROIT REAMER & TOOL CO.

Mfrs. of Special High Speed Cutting Tools

2830 East 7 Mile Rd. Detroit 12, Michigan

in a company, when asked to explain why he felt so happy, replied: "This is a great firm for looking after the interests of its workers. All the bosses, from directors down, worked their way up in the factory, so our future is in our own hands."

The men were all there to work; all the bosses were enthusiastic, cheerful workers, and made it their business to see that enthusiasm and cheerfulness spread throughout the factory. Money was not an issue. Of course, it is easier to hold the interest of the young, who take promotion for granted. It is in later life, when competition is fierce for the fewer plums, that discontent and disappointment creep in. But this can be softened if the company fills all vacancies from works personnel.

Al's concluding observation that low efficiency and lack of job satisfaction are due to a "combination of things, with money a very small part" is a good analysis. Shops should be clean and tidy, which includes machines, benches, and tools; supervisors should never be so loaded with work that they cannot find time to be affable and helpful to all comers. Since youth is man in the making, it should be understandingly led; it won't be driven, and he who aspires to handle youth should be clean and tidy in mind and person, and scrupulously fair in all his dealings.

The foundation on which to build a successful company is a cheerful, competent, contented staff—then the possibilities are almost limitless.

C. D. Mackinnon
Lanarkshire, Scotland

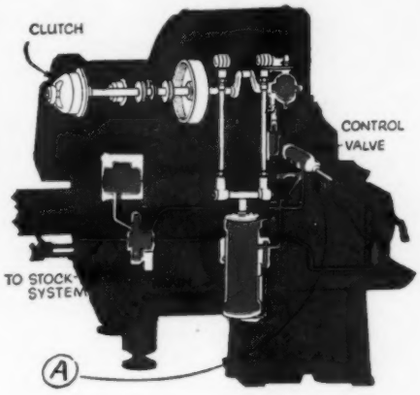
•

BACK UP OR BACK OUT?

Any implication that industries make promotions on a basis of seniority, if given publicity, would be enough to wreck the ambitions of future generations. That there are such companies is a known fact, but their numbers are so few, one could say they are virtually the exceptions that prove the rule.

In my own experience, bolstered by the belief that knowledge and capabilities were requisites to success and not length of service, the obvious thing was to acquire more of both. Thanks to the farsighted individuals who developed night university classes for business folks, such an augmentation was possible. If there is a "royal road to learning," it is certainly not followed by working in a shop from 7 a.m. to 6 p.m., and then on alternate week nights attending lectures or lab classes from 6:30 or 7 until 10:30 p.m. It was

CASE 1048A--STOPPING RUSTING, LACQUERING AND SLUDGE FORMATION IN HYDRAULIC FEED SYSTEMS.



HYDRAULIC SAW-FEED SYSTEM ON METAL-CUTTING SAW

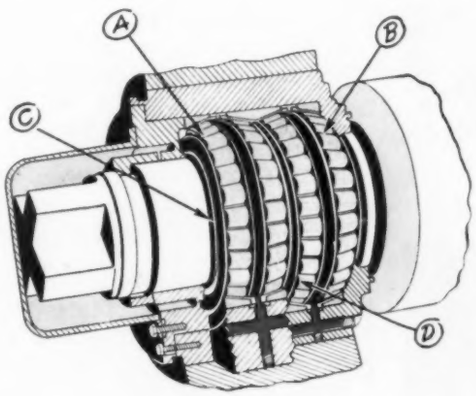
As the hydraulic medium in various machine tool control systems, doubly-inhibited Calol OC Turbine Oil lasted indefinitely . . . it was only necessary to replace oil actually lost from system. Comes in five grades: 5, 9, 11, 15 and 19.

A. Contains highly effective corrosion inhibitor and oxidation inhibitor . . . has excellent metal-wetting ability . . . coating prevents moisture from contacting metal. Resists deterioration and formation of lacquer in hydraulic cylinder or sludge in lines, pumps, sump.

Easily reclaimed - water and solid contaminants separate readily from oil.

Calol OC Turbine Oil is widely used in steam turbines. Protects against rust in initial operation and later . . . turbine charges give service many times longer than straight-mineral oils without showing increase in acidity.

CASE 1047--KEEPING GREASE IN BEARINGS WHERE TEMPERATURES AND PRESSURES ARE EXTREME.



STEEL MILL ROLL NECK BEARING

When the temperature in a roll neck bearing reached more than 200°F., Calol E.P. Roller Grease did not run out. Excellent for all heavy-duty, grease-lubricated anti-friction bearings. Handles easily in pressure systems at all operating temperatures.

A. Contains extreme pressure additives. Lubricating film will not squeeze off under the heaviest loads.

B. Highly water-resistant - sticks on bearings even where excessive water is used for cooling.

C. Melts slowly and feeds evenly ... creeps into small clearances and assures adequate lubrication.

D. Will not corrode bearing metals.

Calol E.P. Roller Grease is made specially to meet conditions of heat and pressure too high for other conventional anti-friction greases.

For additional information and the name of your nearest Distributor, write

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Everything
YOU NEED IN
Sleeve Type
BEARINGS

• *from stock*
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MANUFACTURERS of all types of equipment find Johnson Bronze to be a capable and understanding source of supply for all their Sleeve Bearings. We help them decide *which* type will best suit their needs . . . we manufacture their requirements strictly according to specifications. Regardless of the type of bearing you are using, it will pay you to consult with Johnson Bronze. You will gain every worthwhile advantage: low cost, precision, quietness, corrosion resistance and others.

Immediate Delivery . . . from stock . . . is now possible on replacement bearings. This includes industrial bearings, UNIVERSAL bronze bars and electric motor bearings. Twenty strategically located warehouses plus hundreds of industrial supply distributors are ready to serve you NOW. Write for new catalogue and the location of your nearest source of supply.

JOHNSON BRONZE COMPANY
515 SOUTH MILL STREET • NEW CASTLE, PA.

SLEEVE TYPE BEARINGS
Cast Bronze Bearings
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Sheet Bronze Graphited
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Steel and Bronze Bearings
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Self-Lubricating Bearings
Electric Motor Bearings
Automotive Bearings
Bronze Bars
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done with no feeling that promotions in industry come only as a result of seniority, however.

An industrial nation endowing its young with the knowledge that they can succeed only upon demise or retirement of their immediate predecessors, whose longevity is statistically growing, faces a sorry future.

Encouragements are offered by some companies, but they are exceptions. Fortunately, hope and ambition of the young in heart can flourish on barren ground and humanity will thrive under adversity. Some will plug until the very end, missing only by the smallest margin, but for them there are always new fields to conquer. The stimulus is missing, however, when one must play only a "waiting" game.

As to the wisdom of picking an understudy, since the prime requisite for a good executive is the delegation of authority itself, he who prepares his assistant, and does it well, succeeds in his own job to an identical extent. Basically, as the future belongs to those who prepare for it, such an executive is merely paving his own progress on a good foundation. Fundamentally, therefore, one who finds himself "worked" out of a job, "passed by" by a former assistant, can have only done it voluntarily, or been unfortunate in his choice of employer. In the latter case, that loss should be an incentive not to back up, but to back out.

A. M. Elliott
LeRoy, N. Y.

•

IS BLUE MONDAY INEVITABLE?

The brewing Machine Co., referred to by Ed, certainly hit upon something when it permitted its men to start work an hour later on Monday mornings. It appears that the basic idea in the whole thing is to enable the men to break in easy—like a new car—then the effectiveness will increase after the first thousand miles.

I recall a shop where the extra hour on Monday mornings was appreciated and the boys did not begrudge the loss of the thirty-two cents. They did not breeze in at the last minute and start in to work like a bunch of nervous wrecks. When the time came to go to work, they were completely normalized. They usually arrived at the shop a half hour early, lit their pipes and sat around the Molly West Woodburner, where the history of the week-end would be discussed with candid enthusiasm. There was one old chap who possessed more initiative than the rest, and who ar-

Complete Line of MACHINE TOOL PUSH BUTTONS

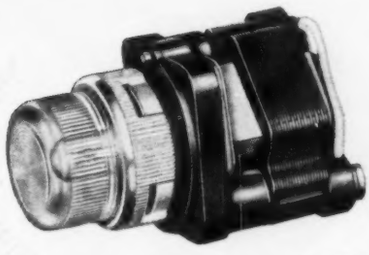
- OIL-TIGHT
- STURDY
- COMPACT
- FLEXIBLE

ENCLOSURES are die-cast for 1 to 4 units and cast aluminum for 3 to 16 units.

UNITS from which stations are assembled have these important advantages—

- Proven oil-tight and coolant-tight by severe tests involving millions of operations.
- All-metal push button operators can take terrific abuse.
- Much more compact, they require substantially less panel and back-of-panel space than previous designs.
- Extra flexibility. A virtually unlimited number of combinations can be obtained from standard units.

Write for Bulletin 9001 Type T. Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wis.



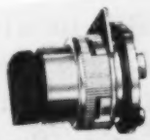
New Pilot Light has Important Features

Wide angle visibility—Unusual brilliance—Integral transformer—Six-volt lamp filament withstands shock and vibration which frequently cause failures of higher voltage filaments—Bayonet-type socket prevents lamp loosening under severe shock or vibration.

Red and Black Standard Push Buttons

Red and Black Mushroom Push Buttons

Selector Push Buttons



2 and 3 Position Selector Switches

5 Kinds of Contact Blocks

Maximum Flexibility with Minimum Stock because . . .

ANY of these Square D Operators can be used with ANY ONE of five Square D 2 and 4 Circuit Contact Blocks

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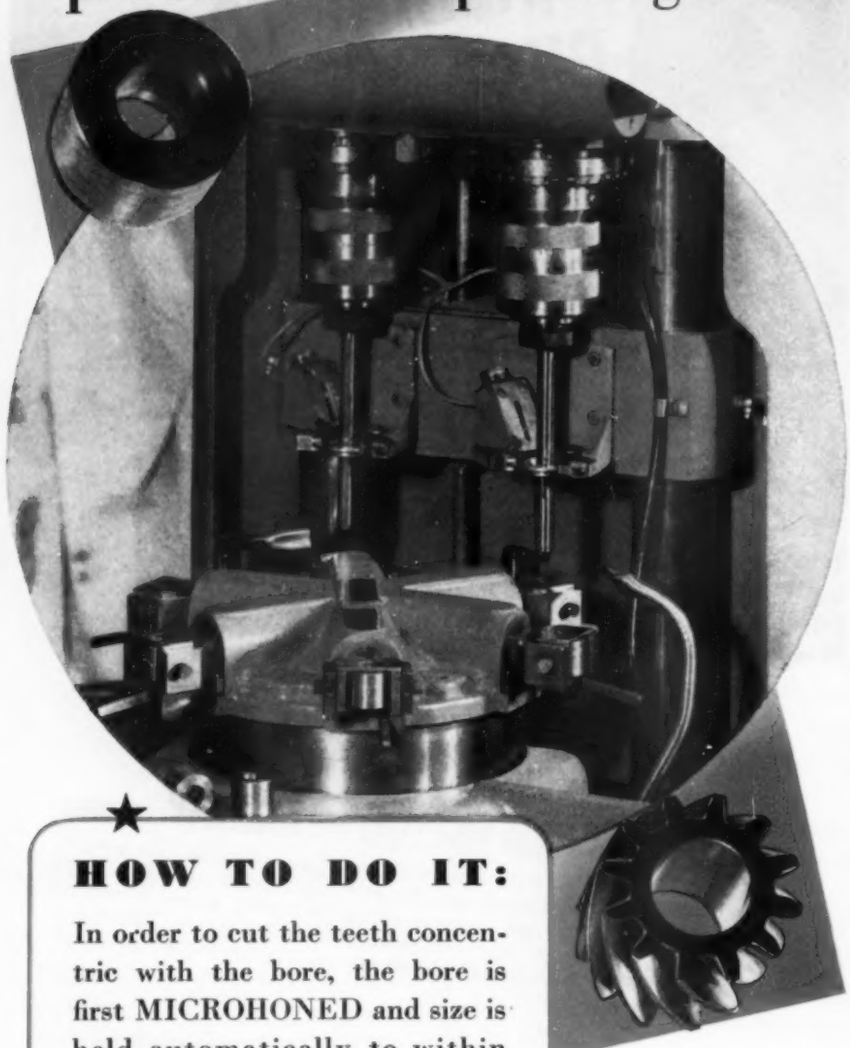
MICROHONE★

for 300% to 400% MORE production of pinion gears



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HOW TO DO IT:

In order to cut the teeth concentric with the bore, the bore is first MICROHONED and size is held automatically to within .0003". The blanks are pressed on an arbor and the teeth are cut. After heat treating, the bore is again MICROHONED to correct any distortion caused by heat treating and to generate any desired surface finish.

No pitch diameter wobble!

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Micromold Manufacturing Div., Boston Post Road, Guilford, Conn.

rived earlier. He used up his easing-in time in massaging his leg, which became unmanageable at times because of its tendency to bend. It seems that the foot spent so many hours on a brass rail that it had become hard for it to remain on the floor.

Those were the good old days when a Republican was Republican and a Democrat was meek and lowly; when a spade was a spade, and it was used aplenty in that welcomed half hour.

Having relieved themselves of their various stories, the men ploughed in with a vengeance when the old air-whistle squeaked in essence: "Come on boys, to hell with the past; let's look to the future. Get the lead out and get going."

John Homewood
Ontario, Calif.

•

The average employee beginning the inevitable Blue Monday morning usually needs an hour of grace before starting his work; however, the company should not be penalized because of a condition over which it has no control.

The suggested plan of an hour, with loss of pay, to permit employees needed recuperation from too-well-spent weekends, has some merit. It may well have a salutary effect by bringing abatement of the time loss due to weekend rehashes. It should bring home to the worker the necessity of arranging his weekends to eliminate Monday yawnings and social circles under his eyes.

As for weekend rehashes and bull sessions, there is a time for those discussions, and that is during lunch period.

The foreman should take up the matter with the men and point out the effect of their actions on the production of the department, thus an amicable solution might be arrived at.

Blue Mondays need not be inevitable if management handles the situation in an intelligent and fair manner. The worker will improve the condition if he knows his employer is aware of the ramifications of human frailties that often constitute Blue Mondays.

Harry Kaufman
Philadelphia, Pa.

•

BOSS . . . AND BUST?

The shop-trained man or apprentice who starts from the beginning in the shop is steadier than the trade-school boy. The latter starts in to study and move along on machines in school, and when he gets in a

Only PHILLIPS

RECESSED HEAD SCREWS

have driver sizes *engineered in BALANCE* with ALL screw sizes . . .

OF ALL SCREW SIZES used in industry, the percentages shown are driven with each of the four driver sizes.

ONE DRIVER SIZE is adequate for the great majority of assemblies—No. 2.

FOR SMALLER OR LARGER SCREWS you want a driver proportioned to the screw to prevent overdriving or underdriving . . . for the same reasons that you use a tack hammer for tacks or a sledge hammer for spikes.

DRIVERS SHOWN ⅜ SIZE . . . RECESSES ACTUAL SIZE

Exhaustive tests in the development of Phillips Screws proved four recess sizes the minimum to assure adequate strength in all head sizes.

Practical Production Assembly *requires*

CONTROLLED DRIVING POWER MATCHED to the SCREW SIZE

Assembly experts know that a driver proportioned to transfer efficiently the power necessary to drive a large, heavy duty screw could be used for smaller screws only at the risk of overdriving.

By using a driver properly proportioned to the screw size, an assembly worker needs no special skill to drive the screw easily and quickly, and seat it correctly, *without overdriving or underdriving.* Overdriving leads to stripped threads and strained screw heads—underdriving impairs assembly strength.

With the Phillips Recess, you know the driver and screw are in perfect *balance,* whatever the size. By varying the length and diameter, the same *balance* is provided in Phillips Bits for hand brace, spiral, or power driving.

To be sure of the driving efficiency and fastening security essential to *practical production driving,* ask for Phillips when you order cross recessed head screws.

SEND FOR THE NEW BOOKLET of facts that tells why you get *all* the advantages of assembly with cross recessed head screws only when you specify Phillips. It's free . . . use the coupon.

GET THIS HELPFUL BOOKLET

Phillips Screw Mfrs., c/o Horton-Noyes Co.
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Send me the new booklet—"How to Select Recessed Head Screws for Practical Production Driving".

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PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

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Take high cost labor off obsolete machines

PRODUCE MORE WITH THE NEW

SIBLEY
MODEL C-20
20" DRILLING MACHINE

10 YEARS AGO LABOR COSTS WERE 1/2 OF TODAY'S — ARE YOUR MACHINISTS NOW USING THE SAME DRILLING MACHINES?

Install a new model C-20 in your plant and make a comparison with production obtained from your present drilling equipment. It will demonstrate the advantages of such features as easy access to controls — where you turn a knob to select the proper geared power feed; convenient shifting of V-belt; power to drill 1½" in mild steel; 8 spindle speeds ranging from 65 to 1360 R.P.M. powered by a 2 H.P. motor.

Model C-20 Sibley 20" swing drilling machine complete as illustrated with 2 H.P., 3 Phase, 60 Cycle, A.C. motor and magnetic type starting switch **$849.75**

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Name_____ Title_____
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shop, the notion is still with him to keep on the move. When he does not, he may quit you cold.

The nature of the man moved up must be considered at the time of advancement. There are occasions when an advancement is resented unless the man is first consulted.

A machinist held down one lathe for 43 years and actually wore it out, plus two maple floors. To this day he is quite stuck on his record and thinks no one else ever did that job as fast or as accurately. He was steady, contented, and saved considerable money during this period.

Another example was of, a good turret-lathe hand ,who was occasionally used on a tool lathe to turn section steel spinning chucks. He was promoted to the tool-lathe as a reward for his good workmanship, at a higher wage. He worked until payday and then quit. In discussing this matter he revealed that he was satisfied to remain where he was; thus he was retained in his old position.

It is necessary to know a man's disposition before you move him.

In my own experinece as a leader and foreman, I do not think we have enough older men in our machine and tool shops today. I can take men with gray hair and get them placed, and run a shop with more efficiency and confidence than with the young fellows. These men like to specialize on machines or work. They are more contented and are not looking for move-ups as much as youngsters. You will find most of them on the job after payday looking for their same old line of work, and that's what most shops want today.

Henry Rasmussen
Niagara Falls, N. Y.

•

No man is justified in accepting another position commanding a raise in pay if the new work will be detrimental to the health and happiness, either of himself or his family.

Dawson probably takes great pride in his craftsmanship and gets much satisfaction in doing a fine grade of work, but has no taste for responsibility requiring him to exact thought and energy to influence others to accomplish that which he gladly does himself.

At the turn of the century there were two factories which offered higher pay than that given in many other plants. One was a powder works, where explosives were made, and I was told that explosions occurred about every two years, which were fatal to an average of about

HORIZONTAL DISC GRINDING, for almost forty years, the simplest means of producing true, flat surfaces QUICKLY and EASILY, *still* is the ideal method on dozens of parts. Most such jobs can be ground free-hand by semi-skilled labor, with an immediate saving made on that score.

Two excellent examples of results from GARDNER HORIZONTAL GRINDING, are shown here:

Grind Your FLAT Surfaces QUICKLY and ACCURATELY — with *low labor* cost — on a GARDNER Horizontal Disc GRINDER

ABOVE: Explosion-proof boxes and conduit boxes are being flat-surfaced on a No. 124–53" GARDNER Horizontal Disc GRINDER. Production rates average from 100 per hour on small parts, to 15-20 per hour on larger sizes. Tolerances of .002" to .003" for flatness are maintained.

RIGHT: A No. 124–53" GARDNER Horizontal Disc GRINDER is shown flat-surfacing transmission covers, spring hangers and hose connections at the rate of 20 to 30 per hour on large parts, and 90 to 100 per hour on small castings. All parts are cleaned up.

Check over the production data above—then

WRITE FOR OUR HORIZONTAL GRINDER BULLETIN!

GARDNER - GRIND YOUR *Flat* SURFACES

GARDNER MACHINE COMPANY

410 East Gardner Street . . . . Beloit, Wisconsin, U.S.A.

How To Save Hack Saw Cutting Time

Cut everything faster from thin wall tubing to heaviest 6¾" x 6¾" bar stock.

Keller No. 3 Hy-Duty

The new No. 3 Hy-Duty Keller Power Hack Saw has patented adjustable feed control that saves you many hours on your hack saw cutting jobs.

When you have thin wall tubing, an easy turn of the hand wheel applies just the proper pressure for fast accurate cutting. When you have heavy bar stock, you can apply up to 70 pound pressure to the hack saw blade. Whatever you cut, you always get maximum speed . . . without injury to saw blade. Time savings quickly pay for this new saw.

OTHER MONEY MAKING FEATURES

Other features include automatic lift on reverse stroke . . . quick acting swivel vise . . . trouble-proof chip-free vane type coolant pump . . . new adjustable foot lift to saw frame . . . heavy rugged box type frame . . . special toggle to insure proper blade tension . . . automatic safety stop switch . . . 100 to 168 strokes per minute.

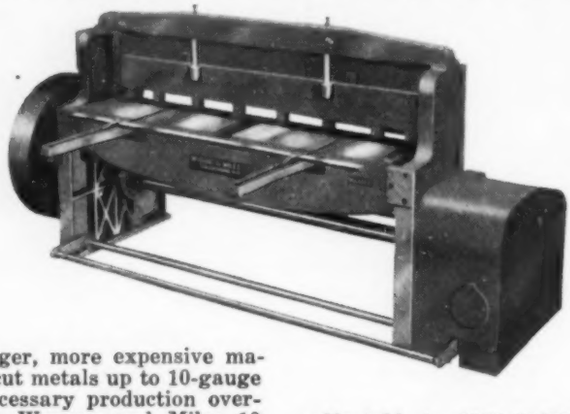
It will pay you to check the many outstanding features of this time saving hack saw at your dealer today, or write Dept. 168.

Sales Service Machine Tool Co.

2363 UNIVERSITY AVE. ST. PAUL 4, MINNESOTA

SPEED PRODUCTION, CUT OVERHEAD

with Wysong and Miles Power Squaring Shears



Using larger, more expensive machines to cut metals up to 10-gauge adds unnecessary production overhead. The Wysong and Miles 10 Gauge Shears, 6 foot and 8 foot in width, can do much of the work you are now routing to larger machines.

That's one reason the Wysong and Miles 10 Gauge squaring shears are ideal auxiliary machines. Relatively inexpensive, in both initial investment and operating costs, they are precision machines with an accent on accuracy and speed.

An important feature is the compensating holddown, with a spring actuated plunger in each foot. Even small strips are clamped firmly without adjustment.

The ball-bearing back gauge is set by a handwheel dial reading, adjustable to .0078 (1/128th) of an inch. Taper shearing is easily accomplished.

Another feature is the jaw-type clutch, so simple in design and operation that it requires only periodic lubrication. For safety and convenience, a non-repeat unit can be set to stop shearing action after each stroke.

Take time now to write for full information about the complete Wysong and Miles line of power squaring shears and other sheet metal machines. **WYSONG AND MILES COMPANY, 623 FULTON STREET, GREENSBORO, NORTH CAROLINA**

three or four men, plus those injured.

The second was an axe factory, where the grinding was the highest paid job in the plant, due to the fact that at that time there was no effort made to protect the operator from the dust and floating grit. No operator was expected to last on the job for many years, and when obliged to quit, he would be broken down in health. However, the higher pay given by these factories enabled them to secure plenty of help.

The percentage of people in this locality who would work at the jobs was very small; however, there were enough who looked upon the fat pay envelope as the highest value, while health, happiness, and the future were given less consideration.

Circumstances in some case may force a man to accept a position that offers a raise in pay, and thus cause him to change his work against his better judgment.

Abel Blakeman
Watervliet, N. Y.

•

SHOULD SUGGESTIONS BE SCREENED?

Human nature being what it is, there is always supervisory resentment against good departmental suggestions. I have watched these things work out, and most foremen get mildly annoyed at first, then irritated, and finally good and sore; and the boys, if they know what's good for them, don't turn in any more.

In one instance, I recall, the foreman let it be known to all that the next guy who turned in a suggestion could look for another job. Suggestions stopped abruptly in his department.

You will find this situation exists at higher levels in engineering and production departments, and elsewhere as well. The boys just don't dare spit against the wind.

By all means let suggestions go to an impartial committee and you will get good suggestions from all of the workers.

J. Murphy
Lakewood, Ohio

•

If an idea for improvement in shop practice is thought of by an individual workman, he should make the suggestion direct to the suggestion committee. If the idea to be advanced came about through the aid of a fellow workman or the foreman, they should have a part in its presentation.

I know of no firm which asks its workmen to pass on suggestions

Here's Proof of TECO CARBIDE UNIFORMITY!

CASE HISTORY No. 28

Part: 11" Brake Drum
Material: Cast Iron
Operation: Finish Face I. D.
Machine: Sundstrand Stub Lathe
Depth of Cut: .025"
Feed: .019"
Speed: 395 s.f.m.

PIECES PER GRIND: 359 — JUNE, 1947

Best previous carbide: 221 pieces
TECO Grade 469 used.

PIECES PER GRIND: 373 — SEPT., 1947

PIECES PER GRIND: 365 — JAN., 1948

PIECES PER GRIND: 368 — JUNE, 1948

ORIGINAL TEST RESULTS *Duplicated*

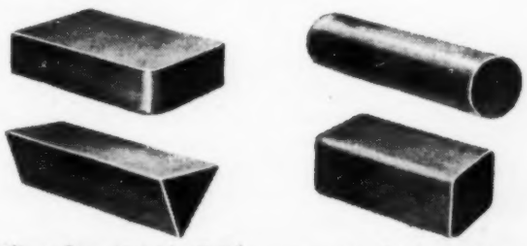
month . . . after month . . . after month . . .

MANY tool men are skeptical of test runs. "How will it perform in regular production, lot after lot?" they want to know. The typical case above, shows how Improved TECO Cemented Carbide answers that question.

In fact, Improved TECO Cemented Carbide has been averaging 3 to 10 times more pieces per tool than other carbides. Doing it consistently, job after job. Permitting higher speeds and feeds. Keeping schedules at peak and tool costs extremely low.

TRY A RUN with Improved TECO on any established carbide job. Run as usual and check the increase in pieces per grind—grinds per tool—total tool life. Send details of your job set-up when ordering any tools, for proper recommendation. Or have one of our representatives or distributors call.

TUNGSTEN ELECTRIC CORP., 568 39th St., Union City, N. J.
Representatives: Indianapolis; Cleveland; Chicago; Detroit; St. Louis; Bakersfield, Calif.



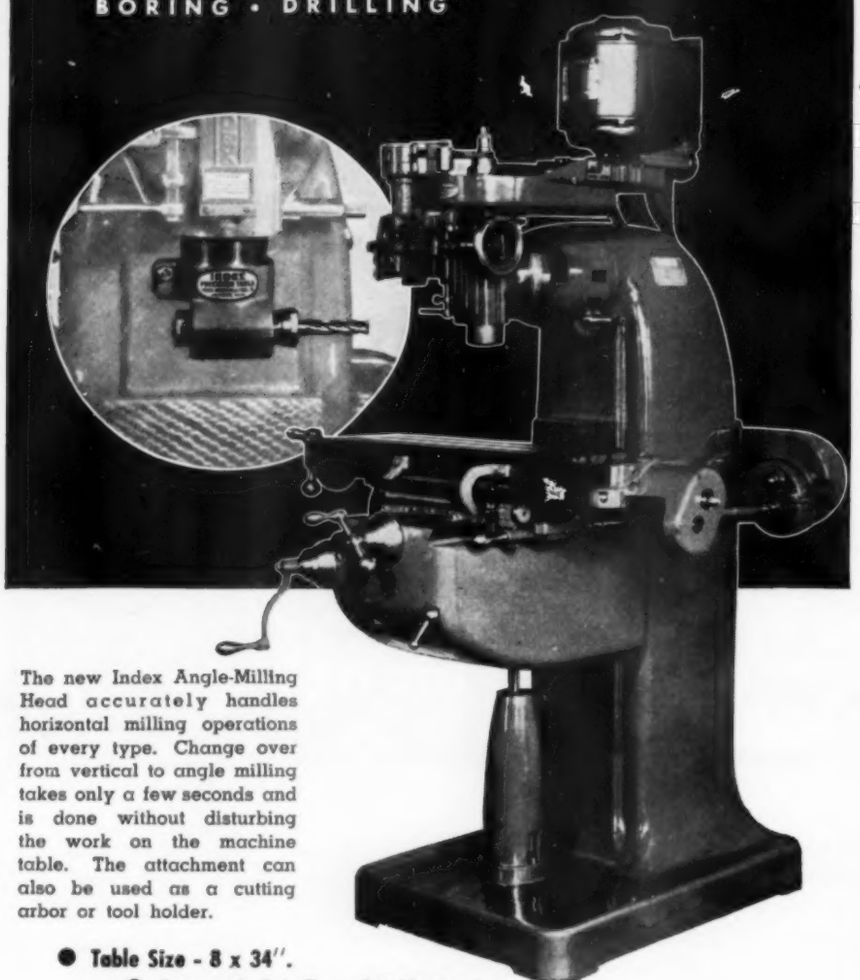
IMPROVED TECO CEMENTED CARBIDE

Manufacturers of Tungsten Carbide—from ore to finished material—for over a quarter century

Increase Production Range with the NEW INDEX MILLING MACHINE

VERTICAL • HORIZONTAL • ANGLE MILLING

BORING • DRILLING



The new Index Angle-Milling Head accurately handles horizontal milling operations of every type. Change over from vertical to angle milling takes only a few seconds and is done without disturbing the work on the machine table. The attachment can also be used as a cutting arbor or tool holder.

- **Table Size - 8 x 34".**
- **Automatic Spindle and Table Feed.**
- **Twelve variable cutter speeds up to 2450 rpm.**
- **Three table speeds can be varied indefinitely.**

The Model 50 Index Milling Machine offers a greatly increased range of working capacity over any machine of comparable size or cost, plus a substantial saving on production time and labor. The sound engineering and solid construction of the machine make an extremely rigid unit without deflection or chatter.

A quick change full-geared table feed mechanism delivers power to the table through a splined feed shaft. The Key Way of the Lead Screw is eliminated, increasing precision and sensitive operation. Hand finishing is reduced to a minimum.

Other features of the Index Milling Machine include precision ground Lead Screws, large, easy-to-read Angle Dials, Automatic Controls throughout and a full line of accessories.

Send Today for the NEW INDEX CATALOG

INDEX MACHINE CO.

540 N. MECHANIC STREET JACKSON, MICHIGAN

through the hands of the foreman; therefore it can be assumed that the preference is that they come direct so that it is clear where the credit should go.

The foreman who is sensitive to having his men send in suggestions direct is likely to be the type who is edging to get into private matters and has a lust for authority.

I agree with Al that absolute non-interference with the man making a suggestion is paramount.

John Mark May
Watervliet, N. Y.

•

The purpose of a suggestion system is to encourage suggestions. Therefore, every means should be used to encourage the workers to submit suggestions, and anything which hinders the flow of ideas to the suggestion committee should be eliminated.

Suggestions must be considered on the basis of their value to the company alone, and personalities should not be considered. There is no reason for the suggestion committee to know who submits the suggestions. This information should be kept by the committee secretary or some representative of management who has no influence over the decisions to accept or reject suggestions. When a suggestion is rejected, the committee should state the reason and encourage the worker to try again. The worker's efforts on suggestions should be recorded on his personnel record with notes indicating the quality of the rejected suggestions. This information would be valuable when considering promotions or transfers to jobs requiring creative effort.

Neither the foreman nor anybody else should be allowed to screen suggestions before they reach the committee. The secret suggestion box is the heart of a suggestion system, and to eliminate this would just about eliminate the system.

Carl A. Johnson
Springfield, Mass.

•

The suggestion-box idea was generated in the mind of an optimistic plant owner. He felt that it would be a fine thing if the combined brains of all workers in business could be put to work considering methods of improvement, means of eliminating waste, and other management headaches.

Unfortunately, the suggestion box has never been too profitable a source for new ideas. The great bulk of men do not possess the type of mind which seeks means of turn-

This is a *Fast Turning* Job

From Which No One Derives a Profit

It may be fun for a puppy to pursue its appendage—but when the puppy is wages and the tail is prices, the situation is serious.

Once in a while the puppy catches the tail—but the strain is too great. So, prices break away—and the mad scramble is on again.

What causes the price-wages spiral?

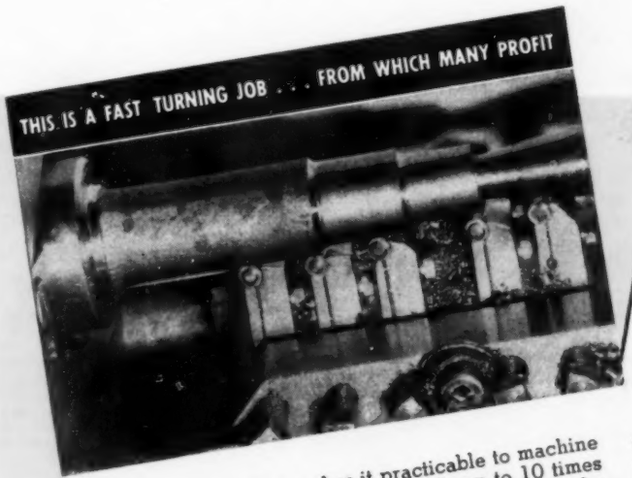
The selfish interest of management, or labor? No, we think not. After all—both groups are composed of good citizens. And, as good citizens, each is entitled to receive fair pay for work done, plus a reasonable reserve to insure future security.

Is it, then, that the intrinsic cost of goods is becoming greater and greater? No. Modern tools of production enable one man and one machine to produce as much as 5 times more than they did 10 years ago.*

What, then? We might as well face the fact—the value of money is becoming less and less. A deteriorating currency is a basic cause of price rises—and wage increases are required to offset them.

The convertible gold standard is not perfect but it is the most practical and reliable measure of value ever devised. It provides the essential inflexible yardstick by which values may be compared, and commitments made with actual, as well as implied integrity.

A bill has been introduced in the Congress to restore stability to the dollar, making all currency freely convertible to gold. We suggest you write your Congressman for a copy of H. R. Bill 5031, study it, and take action.



* Kennametal tooling makes it practicable to machine steel and cast iron at cutting speeds up to 10 times faster than those possible with steel tools; take interrupted cuts on steel and cast iron at the same speeds used for continuous cutting; cut steel in the hardened state, thereby often eliminating annealing and rehardening operations, and . . . turn out from two to five times as much as high speed steel tools on the same machine and in the same time.

This Bill is Needed to Guarantee a Reliable Index of Individual and Corporate Profit

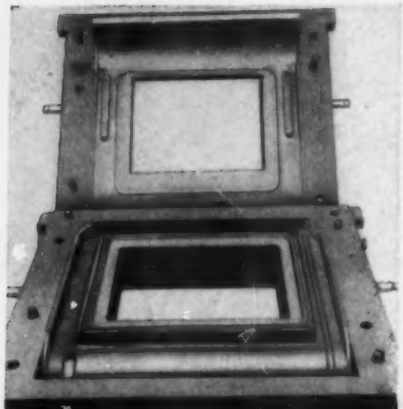
H. R. 5031

To restore the right of American citizens to freely own gold and gold coins; to return control over the public purse to the people; to restrain further deterioration of our currency; to enable holders of paper money to redeem it in gold coin on demand; to establish and maintain a domestic gold coin standard; and for other purposes.

KENNAMETAL *Inc.*

LATROBE, PA., U. S. A.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTION



40% Saving in Machine Time

with

SPEED CASE® PLATE

Produced by Luzerne Rubber Company of Trenton, New Jersey, both male and female sections of this 28"x30" hard rubber, refrigerator door mold were machined from 5" thick Speed Case Plate. The superior machining qualities of Speed Case enabled the manufacturer to effect a saving of 40% over commercial quality hot rolled plate. In this application although a large amount of metal was removed, distortion was negligible.

W. J. HOLLIDAY & CO., INC.

Speed Case - Speed Treat Plate Division

HAMMOND INDIANA

Plants at Hammond and Indianapolis

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OAKLAND 7, California
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Horace T. Potts Co.
CANADA:
Toronto 2, Ontario, Peckover's, Ltd.

SPEED CASE®
• Low Carbon
SPEED TREAT®
Medium Carbon
Open Hearth • Free Machining
STEEL PLATES
W.J. HOLLIDAY & CO. 92

ing out twice the work in half the time, in a third of the space, and with no waste. Workers, or the great majority of them, consider methods of improvement with active disinterest; they feel, and perhaps rightly so, that every plant is entitled to its burden, and that this is it.

That leaves two types of men: the clever mechanic who does have a genuine idea which may or may not be practical, and the fanatic suggestor. If the man with a real idea turns it in to the foreman, that's the end. The foreman always has and always will resent the suggestion. I don't know who issued the first license to foremen certifying them to be sole judges of the true worth of their men's ideas, but each foreman carries that license.

To protect the suggestor and to give him a square deal, it is a positive necessity that suggestions not be screened through his immediate superior. They should go, and usually do go, before an impartial board which assigns them to individuals to evaluate.

There is a trait in human nature which prevents a man from impartial judgment of suggestions for improvement in his own department. Many of the suggestions concern practices over which the foreman has control. It isn't right to ask him to throw stones at himself. The principle is wrong. Asking foremen to screen suggestions in their own departments is like asking men who are on piecework to inspect their own work for quality. They'll do it—and how.

James K. Matter,
Detroit, Mich.

•

MORALS OR MORALE?

The answer to this one is, "Thou Shalt Not."

I remember some time ago when I was in charge of a plant that we had a problem in the shipping room. Things were going from bad to worse and one of the females seemed to be the cause of it all. Instructions were given to the foreman to replace the girl. Nothing happened, and when the issue was again brought up, the foreman confided that he couldn't fire the girl because the president took her out.

In another case there was a social pariah on the night shift romancing with the married help, and that shift had to be dispensed with in order to get rid of her.

Executive romancing is out and top brass should make that clear.

J. Murphy
Lakewood, Ohio

SCHERR *aids to precision – production*

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have vernier reading to 1/10,000

at no extra cost, in 1", 2", and 3" sizes. This is right in step with modern demands for higher accuracy. Available in sizes up to 96". All Scherr micrometers offer these advantages: solid forged frames; easy reading graduations on thimble and vernier; longer life and more sensitive touch due to a burnishing process which compresses and polishes the surface of the thread; ratchet stop to control the measuring pressure, and decimal equivalent markings on frame or barrel. Prices, 1", $8.25, 2", $9, 3", $9.75. Write for bulletin and order the micrometers you need now.

Measure depth easily with these

DEPTH MICROMETERS

Made with 2½" and 4" base. Each instrument furnished with three interchangeable rods, to measure depth to 1", 2", or 3". With or without ratchet. A handy tool that can save its cost in a single precision job. Price, with ratchet, 2½", $10. 4", $11.25.

A real snap gage service —

ATLANTIC

(adjustable limit)

SNAP GAGES

Made in strict accordance with American Gage Design Committee specifications. Frames of Mechanite. Wide range of sizes, from .195 to 11⅜". With round or square gaging pins, solid anvil, extended anvil, etc. The last word in snap gages, and at most interesting prices. Write us for details—and also about the Scherr special service for trueing and setting worn gages.

Speed inspection with the

SCHERR TOOL STAND

Cuts inspection time almost in half by freeing both hands of operator, and holding micrometer or snap gage in most convenient position. Also prevents body heat affecting tool readings. One of those small, inexpensive items worth many times its cost in saved time. Try a few—then order a quantity. Price, $7.50.

An invaluable inspection tool—the

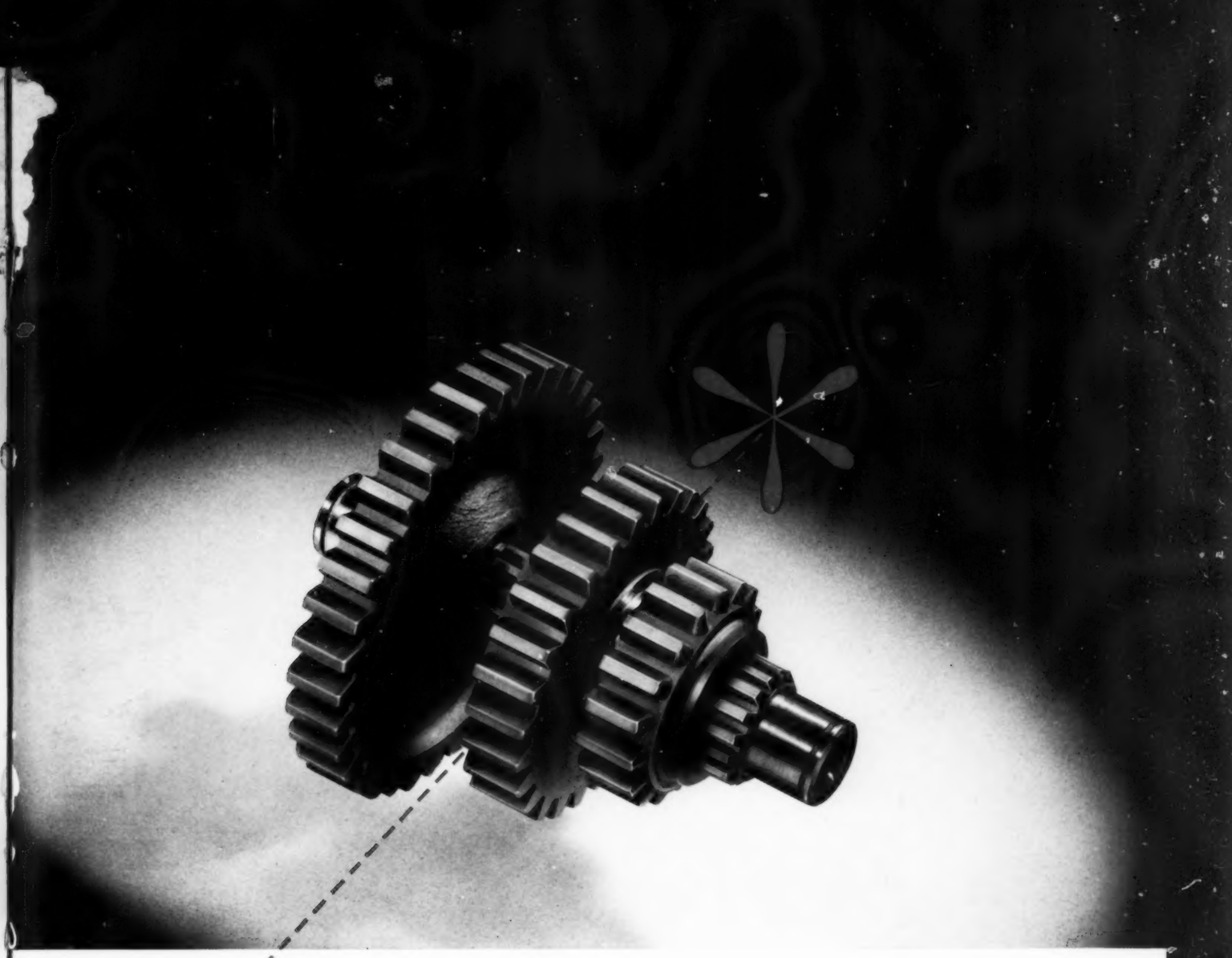
SCHERR MAGNI-RAY

Magnifies the work under inspection, floodlights it as well, and gives the immense advantage of "two-eye seeing." Thousands are serving large inspection departments, and on precision machines or critical toolroom operations. The lens is ground by experts for true magnification. Heavy base permits swinging lens to any position any height to 14 in. Three types—Model A, 3" lens, 1½x plus, $21.65; Model B, 3x plus, $29; Model C, 5" lens, 1½x plus, $34.

Write for details of these tools

GEO. SCHERR CO., Inc.

210-D Lafayette St. New York 12, N. Y.



*Meet a husky handful of gears

This sub-assembly—a cluster gear and a single gear mounted on a spline shaft—form a component part of an exceptionally compact transmission. A transmission that is called upon to move mountains of weight every day.

These gears must be rugged. They are. They must be extremely accurate. They are. They must seek to avoid selective fit. They do — thanks to manufacturing and inspection procedures that produce a high degree of interchangeability. And like all Double Diamond gears, they must pile up an impressive on-the-job work-record. This they have done, for a long, long time.

For over twenty-five years we have liked to think of Double Diamond gears in this way: that they will be made as well as we know how to make them—to do specific jobs as well as they can be done. This sub-assembly of gears and spline is one example of that thinking. Any job we are privileged to do for you will be another. Why not write?

DOUBLE DIAMOND
TRADE MARK
GEARS

Made by
Automotive Gear Works, Inc.
RICHMOND, INDIANA

• • • • FOR AUTOMOTIVE FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS • • • •

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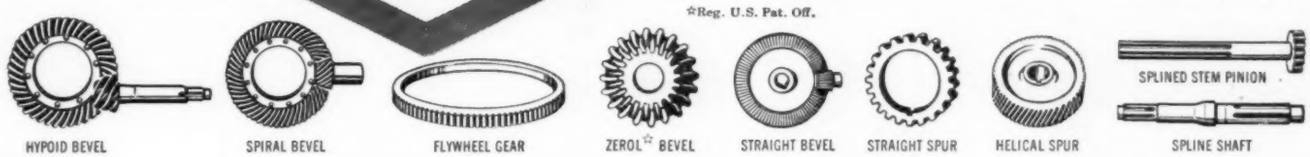

HYPOID BEVEL · SPIRAL BEVEL · FLYWHEEL GEAR · ZEROL☆ BEVEL · STRAIGHT BEVEL · STRAIGHT SPUR · HELICAL SPUR · SPLINE SHAFT

IT'S TAPER-LOCK! IT'S REVOLUTIONARY!

The simplest, surest mechanism ever devised for holding wheels to shafts. Another Dodge "first" —and the biggest development in this field in years!

The TAPER-LOCK Sheave breaks all speed records in mounting. Slip it on, line it up and tighten while sighting! Saves time— saves money.

Easy on, easy off! Disengages with less effort; holds fast to the shaft with firmness equivalent to a shrunk-on fit.

No flange. No collar. No protruding parts. Close mountings are possible. Bushing extends entire length of hub. TAPER-LOCK runs *true.*

A complete unit—in a complete range of sizes in Dual Duty (A and B); B, C, and D grooves. Write us for detailed bulletin, A175C, on this new and different taper bore sheave.

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana

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of Mishawaka, Ind.

CALL THE TRANSMISSIONEER

He is your local Dodge Distributor—factory trained—qualified to suggest ways to improve your machine performance, increase production. Look for his name under "Power Transmission Equipment" in your classified phone book.

TAPER-LOCK: Trade Mark Registered U. S. Pat. Off.

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FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

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These Bolts are undersize

These Bolts are just right

Circle Ⓑ Bolts and Nuts . . . both standard and special . . . are manufactured on the latest precision machinery. They are held to close tolerances that assure easy installation and dependable service.

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precision body styling through Baldwin Die Spotters

The absolute die accuracy demanded by two of the nation's leading automobile manufacturers is guaranteed by Baldwin Die Spotters.

Truly, a precision tool-maker's instrument, these units feature micrometer adjustment—positive parallelism—high point indication—and hydraulically operated transfer tables to facilitate the handling of heavy dies.

Baldwin builds a complete line of high speed, metal-working, hydraulic presses for the automotive industry.

Write or call your nearest Baldwin district office for full information. Ask for Bulletin No. 285.

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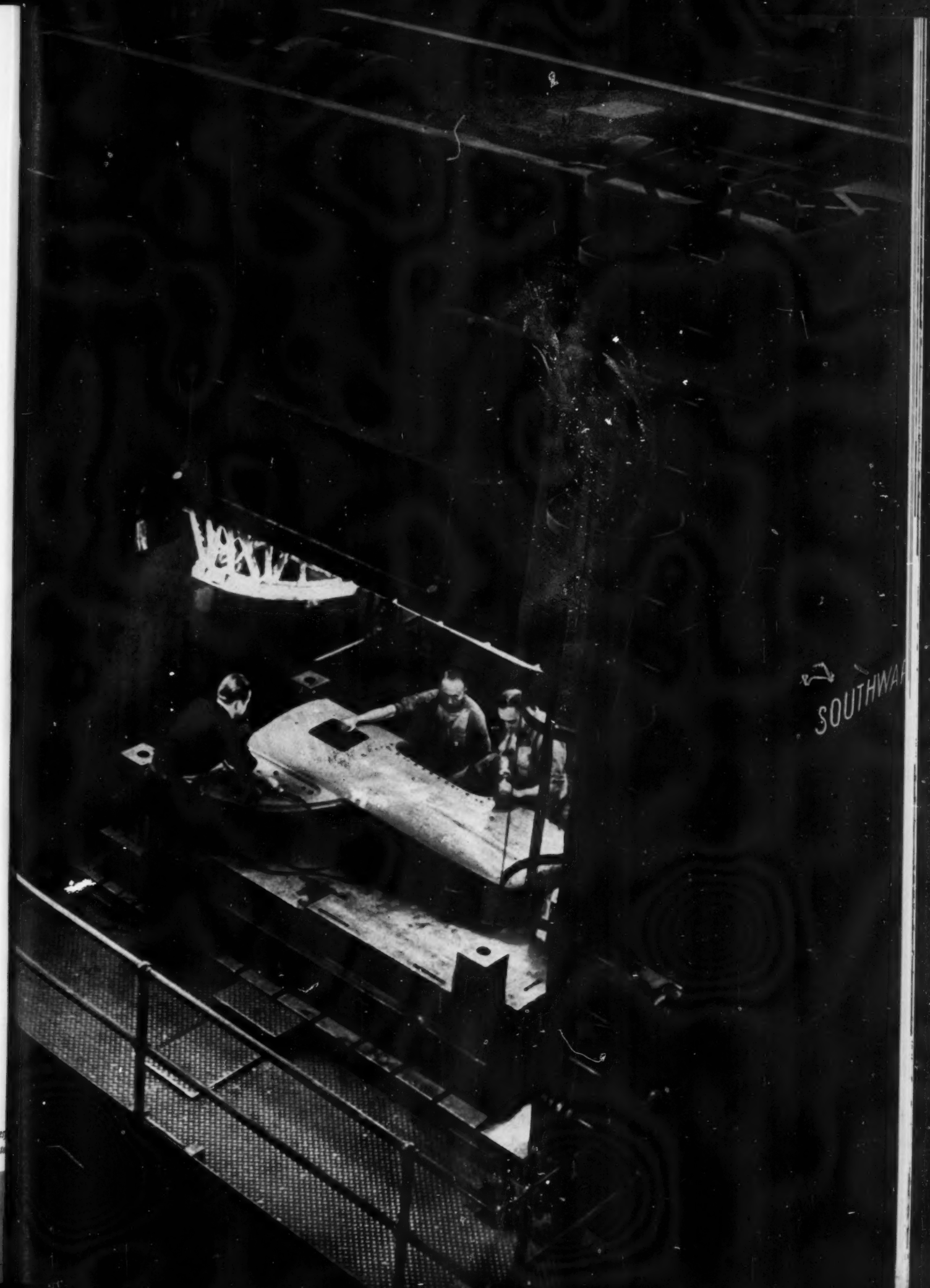
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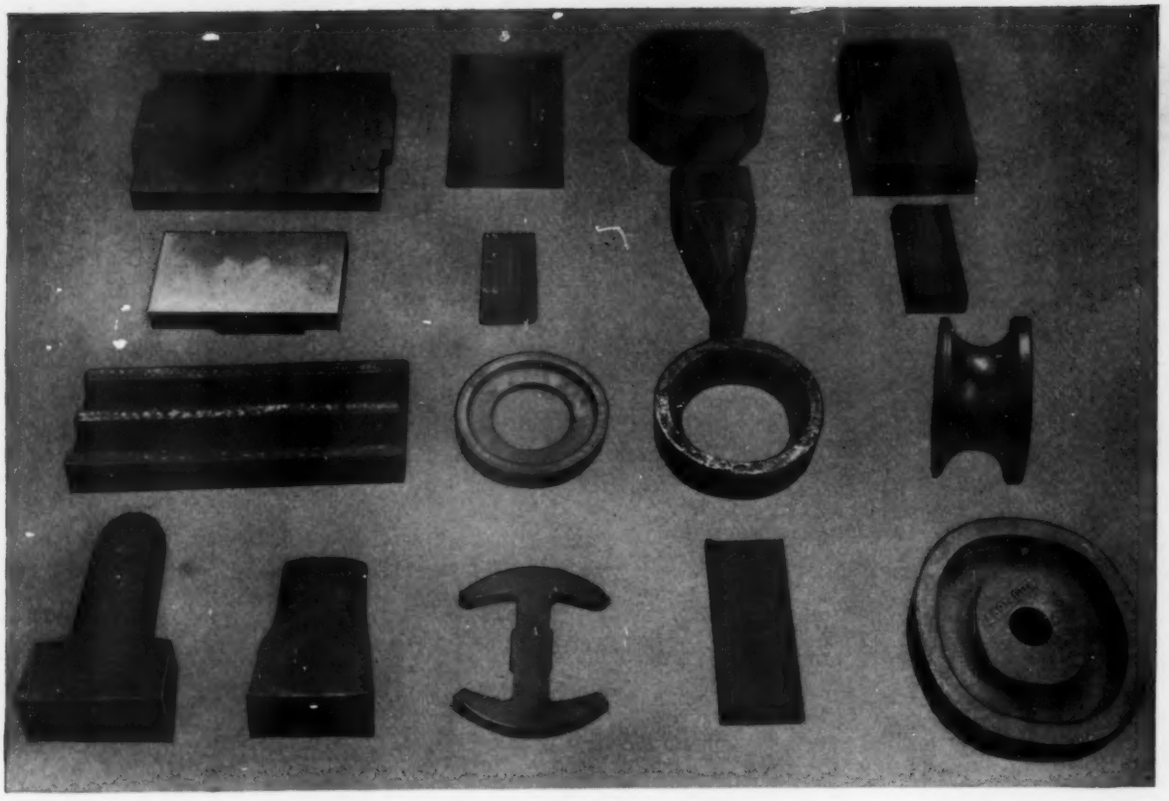

Start with Your Job *Half Finished!*

Write for New Booklet:

CAST-TO-SHAPE

TOOL STEEL

Gives you full details on FCC Air Hardening, Oil Hardening and other Cast-To-Shape Tool Steel Specialties capable of saving you time and money.

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ADDRESS DEPT. AM-76

WHEN it's dies you're making—small or large—or various other forming tools or gages or certain fast-wearing parts of machines, FCC Tool Steel *Cast-To-Shape* can really save you shop time and money.

Very intricate shapes can now be cast in one piece within an eighth-inch of finished size. This means that you pay for less steel to begin with, and reduce machining time substantially.

Air Hardening, Oil Hardening and special Hot Work Tool Steels of various grades—each a thoroughly dependable performer in its class—are promptly available in this modern, economical form, ready to reduce your costs.

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Above: CLEARING 3000 TON CRANKLESS PRESSES making rails for automobile chassis.

Right: CLEARING 75 TON GAP FRAME PRESSES in a large appliance plant.

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Thirty-foot rails for bus frames or parts for a household appliance — Clearing presses turn them out swiftly and completely, ready for assembly with no labor costs for grinding, drilling or other subsequent operations. Because Clearing presses deliver accurately formed work, assembly is smooth and rapid. No wonder that production costs are driven down.

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Whether you need 60 tons capacity or 3,000 tons or more, Clearing can furnish a press that will produce for you with maximum economy when all factors are taken into account. That's a plain, straightforward statement. We'd like to have you make us prove it.

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KNIGHT EQUIPMENT
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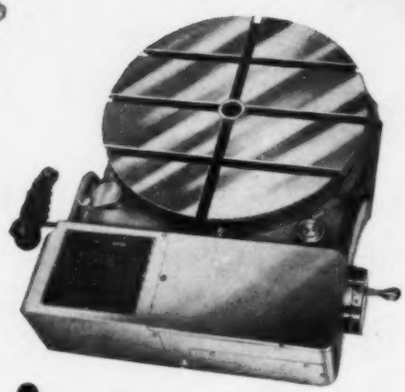
No. 50 PRECISION BORING AND VERTICAL MILLING MACHINE

Adaptable to an extreme variety of difficult jobs. Eliminates work transfers, reduces set-up time to a minimum. Combines advantages of both a solid base precision boring machine and rigid vertical miller. Unusual capacity. Fast and simple operation.

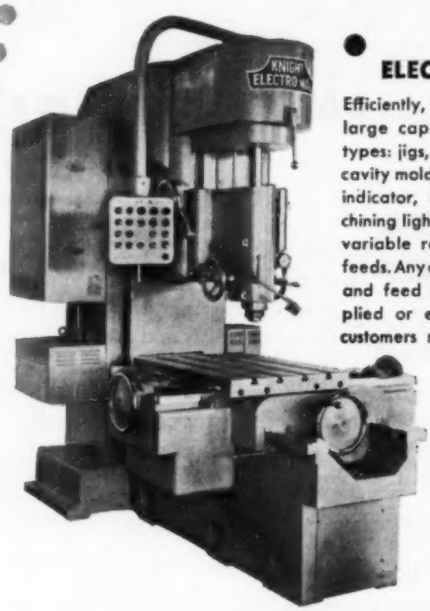


20" ROTARY TABLE

A self-contained motor-driven unit which adapts any milling machine for rotary milling or indexing. Eliminates set-up time. No installation — just plug into electric outlet. 18 Feed changes, 1½" to 54" or 3" to 108" per minute.

HOLE GRINDING ATTACHMENT

Accurately and quickly finishes holes and bores up to 6" diameter in hardened parts. Simplifies handling work too large to swing in standard machines. Special adaptors permit easy installation on any milling machine.



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Efficiently, economically handles large capacity work of many types: jigs, metal patterns, multi-cavity molds, jig boring with dial indicator, drilling, milling, machining light metals, etc. Infinitely variable range of speeds and feeds. Any combination of speeds and feed controls can be supplied or eliminated subject to customers requirements.

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IS *the* MACHINE
FOR PRECISION
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Cosa engineers can recommend the correct SIP Jig Borer to bring the utmost accuracy and capacity to your range of work. Each machine illustrated is equipped with the famed SIP measuring system, using standard scales graduated to .00005" and read by built-in microscopes. The entire system is free from wear and mechanical stress, and assures absolute uniformity of measuring and machining. Write for complete mechanical specifications and performance data. Representatives for SIP in United States and Canada.

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AO Sta-Set Finger Cots are "Tailored To The Job"

These AO Finger Guards are built to the same protective, comfort, and "tailored-to-the-job" standards as the larger items of AO Safety Clothing. The 8X141 Finger Cots, made from soft, flexible grain leather, are ideal for jobs where sensitivity of touch is a must, as in soldering small wire. For jobs such as polishing, burring and grinding small parts, where rough usage is customary, companion Finger Cot 8X142 of chrome tanned split leather is recommended.

AO Finger Cots stay put on the finger! They are held in place by an elastic strap which allows full freedom of finger movement. Available in small, medium or large sizes. Your AO Safety Representative can give you speedy delivery.

Safety Division of American Optical Company

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a Dumore* keeps your costs In the Groove

...by saving you time and money on your grinding, drilling, and light milling jobs

The Joyce-Cridland Company can tell you about cutting costs with a Dumore. They make jacks and auto lifts. Accurate grinding of ball races gave them quite a headache. First they tried hand-polishing after roughing out on a lathe. That cost them too much. Then they tried an air grinder. That tool wore out quickly on this tough job.

But the third try was a charm. They mounted a Dumore No. 7 (¾ HP) on a 40 year old lathe. This set up gave them a perfect job — and continues to do so after more than 2 years. What's more, *their cost is only 53¢ a part (of which 45¢ is for labor)!*

Keeping costs down is often secondary to doing a job right — but a Dumore does both for you.

You too, can cut your costs with Dumores!

You know about Dumore's dependable precision for toolroom grinding. But that's only half the story. You can do so many different toolroom, maintenance, and production jobs with a Dumore that it is now a "universal" shop tool.

You can use a Dumore for all kinds of grinding — external, internal, surface, tool, and thread. You can set up a Dumore for drilling and light milling, too. A Dumore converts your standard machine tools into precision grinders. A Dumore is a top-notch work-head for special set-ups you can build at low cost. Quite often, a Dumore can help you avoid buying a high-priced machine.

Plan to do *more* with Dumores! See your Dumore distributor today. Ask him to tell you the complete Dumore story. There are 7 models, with interchangeable quills for work to 24" depths, at speeds up to 42,500 rpm, with ±.0001" precision. And don't forget Dumore Handgrinders and other tools. They help you cut your cost on many jobs, too!

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Sold by leading industrial distributors in all principal cities.

FREE ... Complete certified report on this Dumore job is yours for the asking!

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Yes, I'm interested in cutting costs and doing a better job!

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☐ Send me your certified report of Dumore grinding at Joyce-Cridland Co., Dayton, Ohio.

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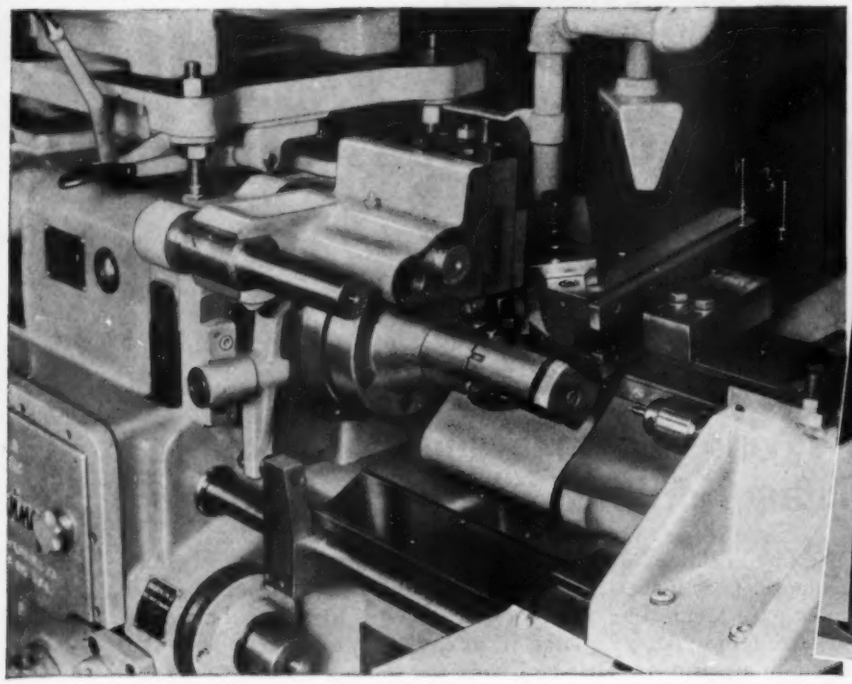
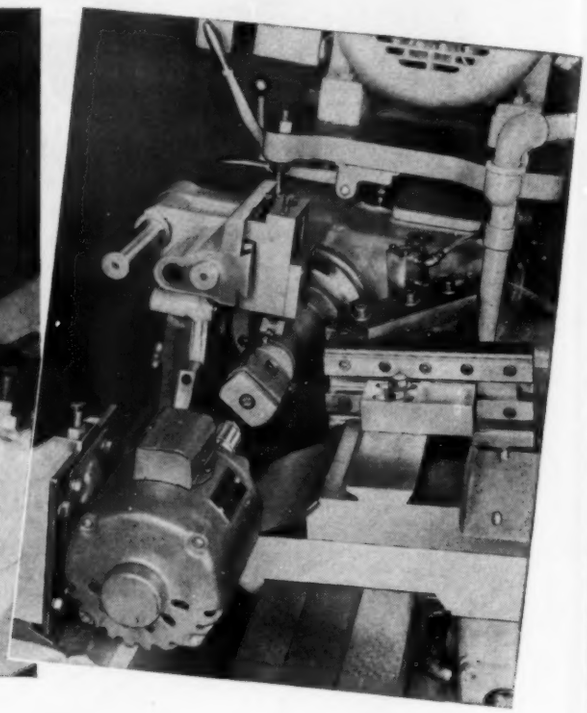
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. **"THE *Lo-swing* PEOPLE"** SENECA FALLS, NEW YORK





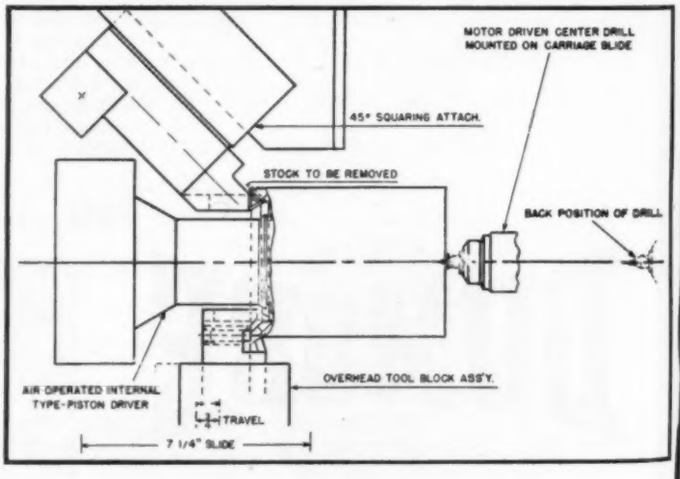
MODEL "LR" AUTOMATIC *Lo-swing* LATHE with SPECIAL TOOLING for FAST BORING and CENTERING OPERATIONS on PISTONS

Problem: To bore, chamfer, face and turn skirt of piston and center closed end true with rough bore.

Solution: The Model "LR" Automatic Lo-swing Lathe selected was equipped with the special tooling shown in the close-up views above and in the line drawing.

The air operated centering arbor is fitted with a spring loaded centering plate which centers the piston from the bottom of the bore, while three air operated jaws center the open end. The piston is held back against the centering plate by an air operated pull bar and by a pin introduced thru the gudgeon pin hole. After the piston is clamped in position, the boring, turning and facing of the open end of the skirt is machined with tools mounted on the overhead slide. Simultaneously the chamfering operation is made with a 45° squaring attachment, mounted on the rear of the lathe. The centering of the closed end is accomplished with an electrically-operated centering head. All tools operate simultaneously and a high hourly production is obtained. The operation is entirely automatic, the operator simply loading and unloading the parts.

Consult our Engineering Department for Automatic Lo-swing Lathe with tooling engineered for your particular machining problems.


MOTOR DRIVEN CENTER DRILL MOUNTED ON CARRIAGE SLIDE
45° SQUARING ATTACH.
STOCK TO BE REMOVED
BACK POSITION OF DRILL
AIR OPERATED INTERNAL TYPE-PISTON DRIVER
OVERHEAD TOOL BLOCK ASS'Y.
TRAVEL
7 1/4" SLIDE

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

THE *Responsibility* OF COMMUNITY LEADERSHIP

YOU as a leader in your community have a sacred obligation--to yourself, your family, your neighbor and your country, Use your experience and knowledge to the full extent of your ability to shape a public opinion which will help to establish right and justice for a lasting world peace, and preserve our country's cherished heritage of freedom for the individual.

Only through the intelligent, active work of community leaders can we keep America as the impregnable citadel of liberty and freedom.

The Youngstown Sheet and Tube Company

General Offices--YOUNGSTOWN 1, OHIO
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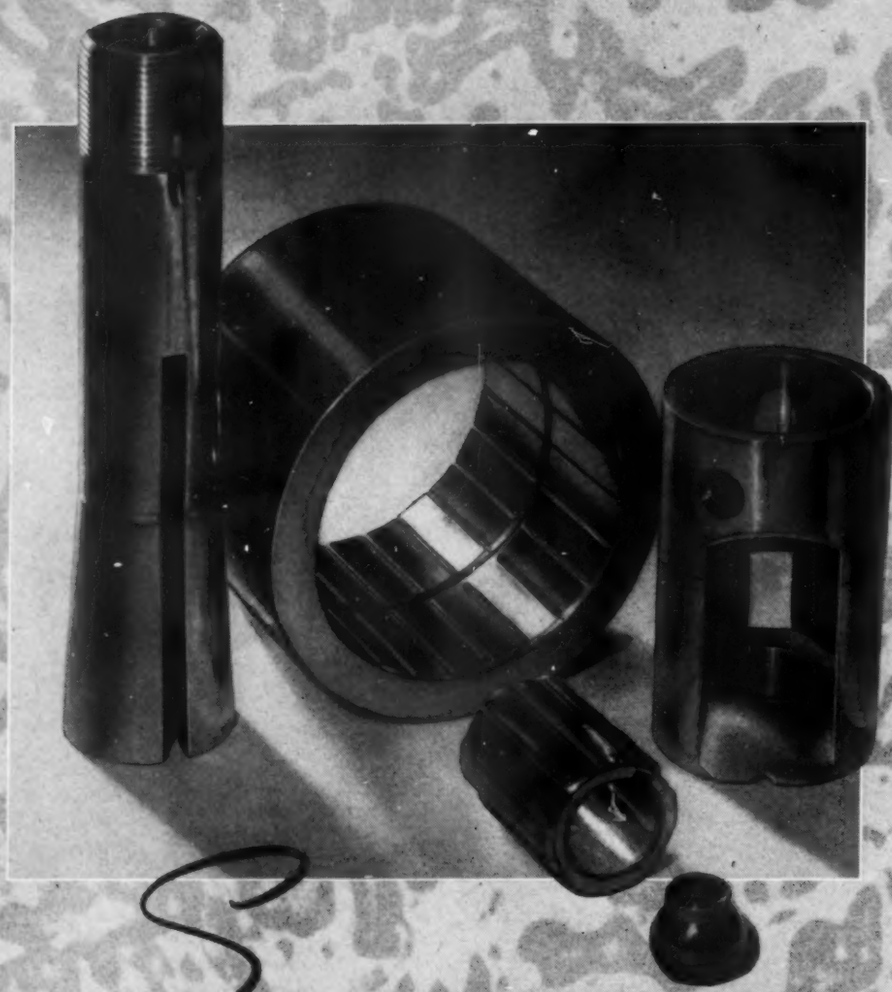
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS
Pipe and Tubular Products-Sheets-Plates-Conduit-Bars-Rods-Wire-Electrolytic Tin Plate-Coke Tin Plate - Cold Finished Carbon and Alloy Steel Bars - Tie Plates and Spikes.



Sleeve bearings are not damaged by microscopic particles in the air or the lubricant. Bunting Bearings should be handled with care and cleanliness, but do not require the observance of surgical standards for their successful use. Bunting Engineers are prepared to assist in designing new installations. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in Principal Cities.

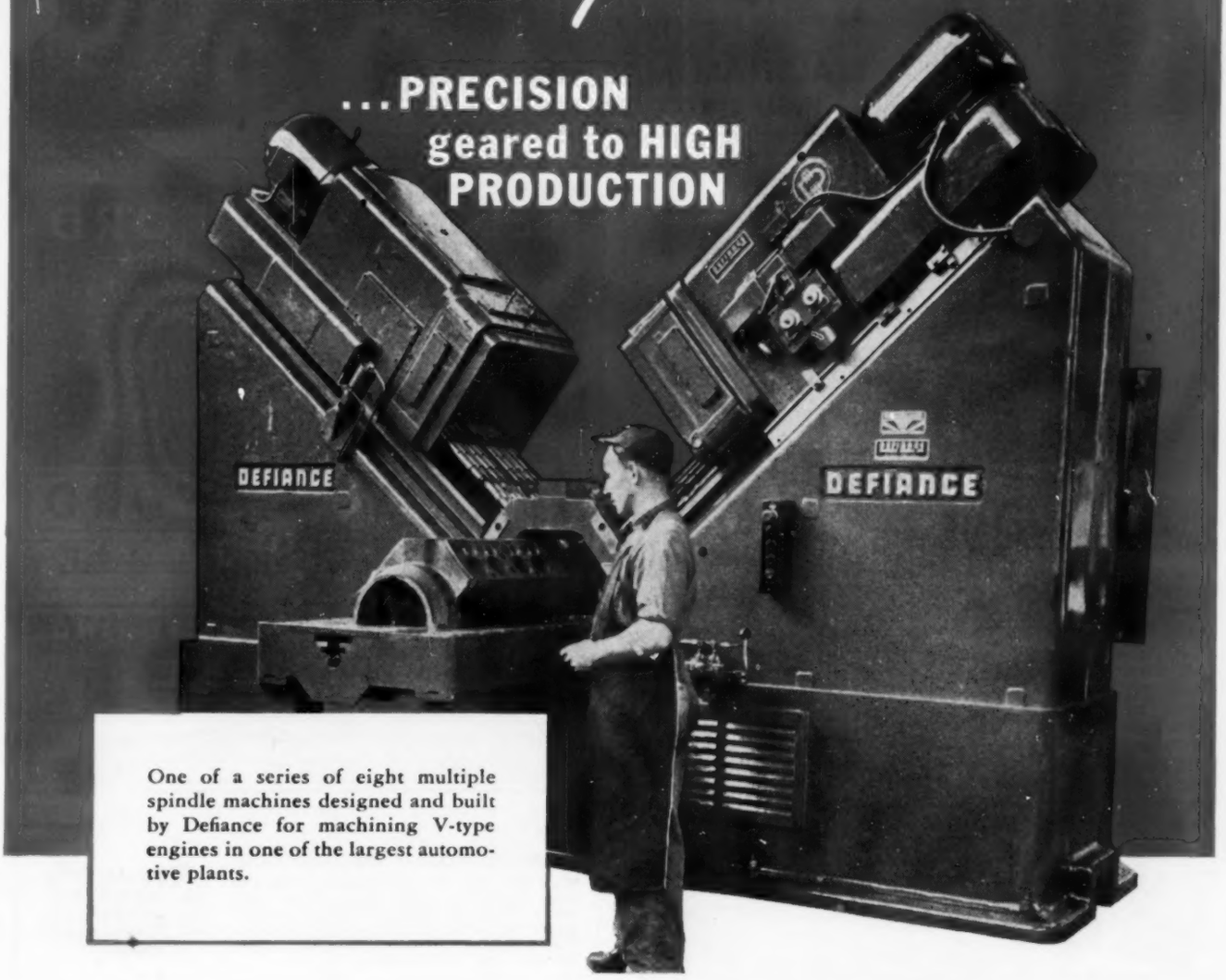
Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

60

V-type Automotive Engines Machined by DEFIANCE

...PRECISION geared to HIGH PRODUCTION



One of a series of eight multiple spindle machines designed and built by Defiance for machining V-type engines in one of the largest automotive plants.

A series of eight of these Defiance-engineered machines handle the job of machining valve and insert holes in the manufacture of V-type automotive engines.

A difficult job—demanding the utmost accuracy—pacing the world's fastest production lines!

These machines designed with Defiance No. 37 Hydraulic Unit Heads . . . performance-proved in many applications . . . easily adapted to your special problems in drilling, reaming or tapping. For precision and efficiency — to improve quality and reduce costs—bring your boring—milling—drilling problems to Defiance. Write . . . Defiance Machine Works, Inc., 2325 Madison Ave., Toledo, Ohio.

98 YEARS OF PRECISION MANUFACTURE

DEFIANCE

BORING . . . MILLING . . . DRILLING AND TAPPING MACHINES

WALTHAM SUB-PRESSES...

...for precision work

Arch Sub-Press

The cylindrical plungers in the Waltham Sub-presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

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of TRIMMING FORMED PARTS
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The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind. Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.

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HIGH SPEED BAND SAWS

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"I *like* to lay-out Federal NOARK Bus Duct! I can draw up the standardized units as soon as the plant layout is established. And, because there's a plug-in receptacle on either side—on one-foot centers—I don't have to worry about the exact position of every machine and motor."

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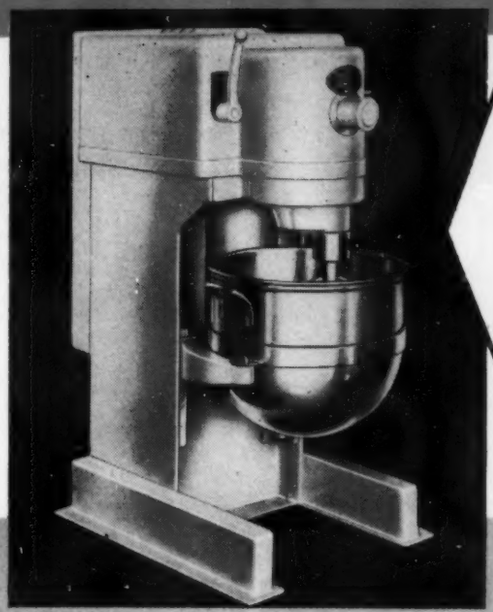

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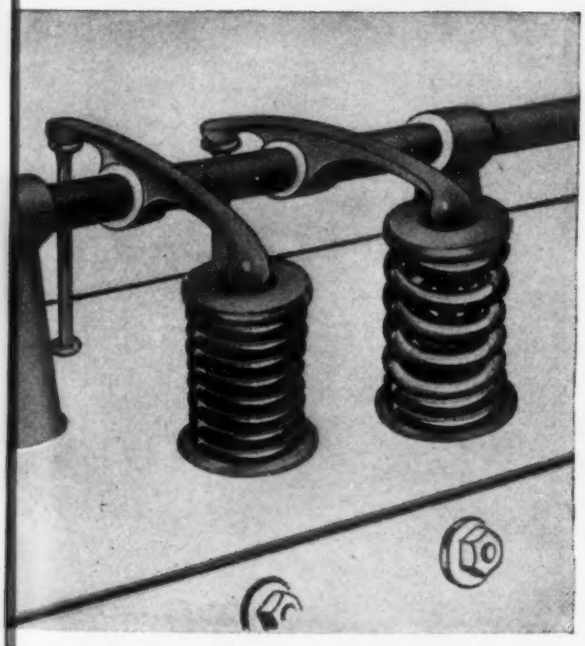

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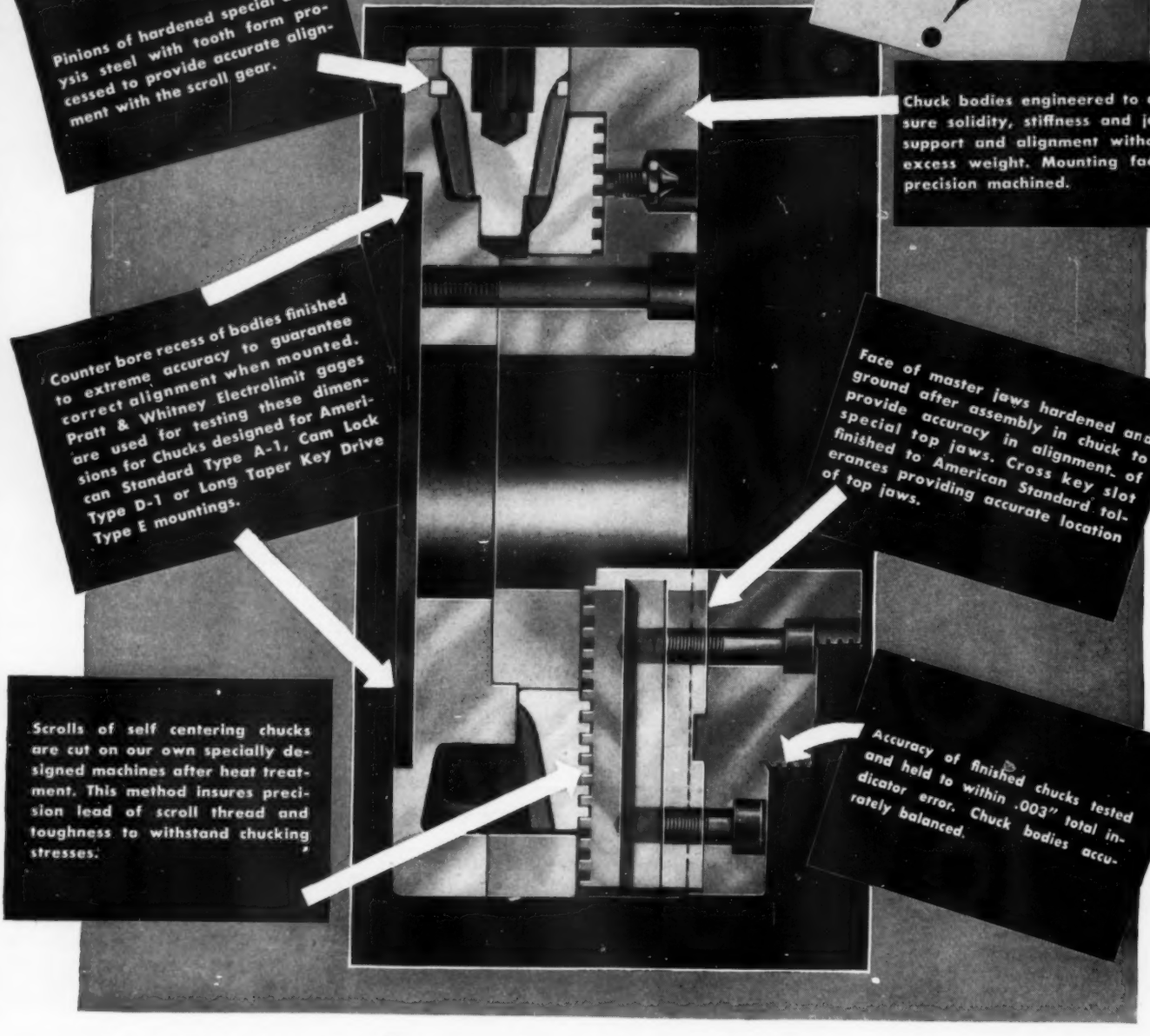

Pinions of hardened special analysis steel with tooth form processed to provide accurate alignment with the scroll gear.

Chuck bodies engineered to assure solidity, stiffness and jaw support and alignment without excess weight. Mounting faces precision machined.

Counter bore recess of bodies finished to extreme accuracy to guarantee correct alignment when mounted. Pratt & Whitney Electrolimit gages are used for testing these dimensions for Chucks designed for American Standard Type A-1, Cam Lock Type D-1 or Long Taper Key Drive Type E mountings.

Face of master jaws hardened and ground after assembly in chuck to provide accuracy in alignment of special top jaws. Cross key slot finished to American Standard tolerances providing accurate location of top jaws.

Scrolls of self centering chucks are cut on our own specially designed machines after heat treatment. This method insures precision lead of scroll thread and toughness to withstand chucking stresses.

Accuracy of finished chucks tested and held to within .003" total indicator error. Chuck bodies accurately balanced.

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Gorton equipment may save you money. Write for free Bulletin 1655 — see coupon below — or inquire about Gorton Engineering Service.

JOB FACTS!

JOB "Short Run" duplicating of piston head shape

MATERIAL Aluminum Alloy

MACHINE Gorton Duplicator with Tracer Control

CUTTERS 3/8" Tung-carbide shaped to fit angles of master; 2 flute

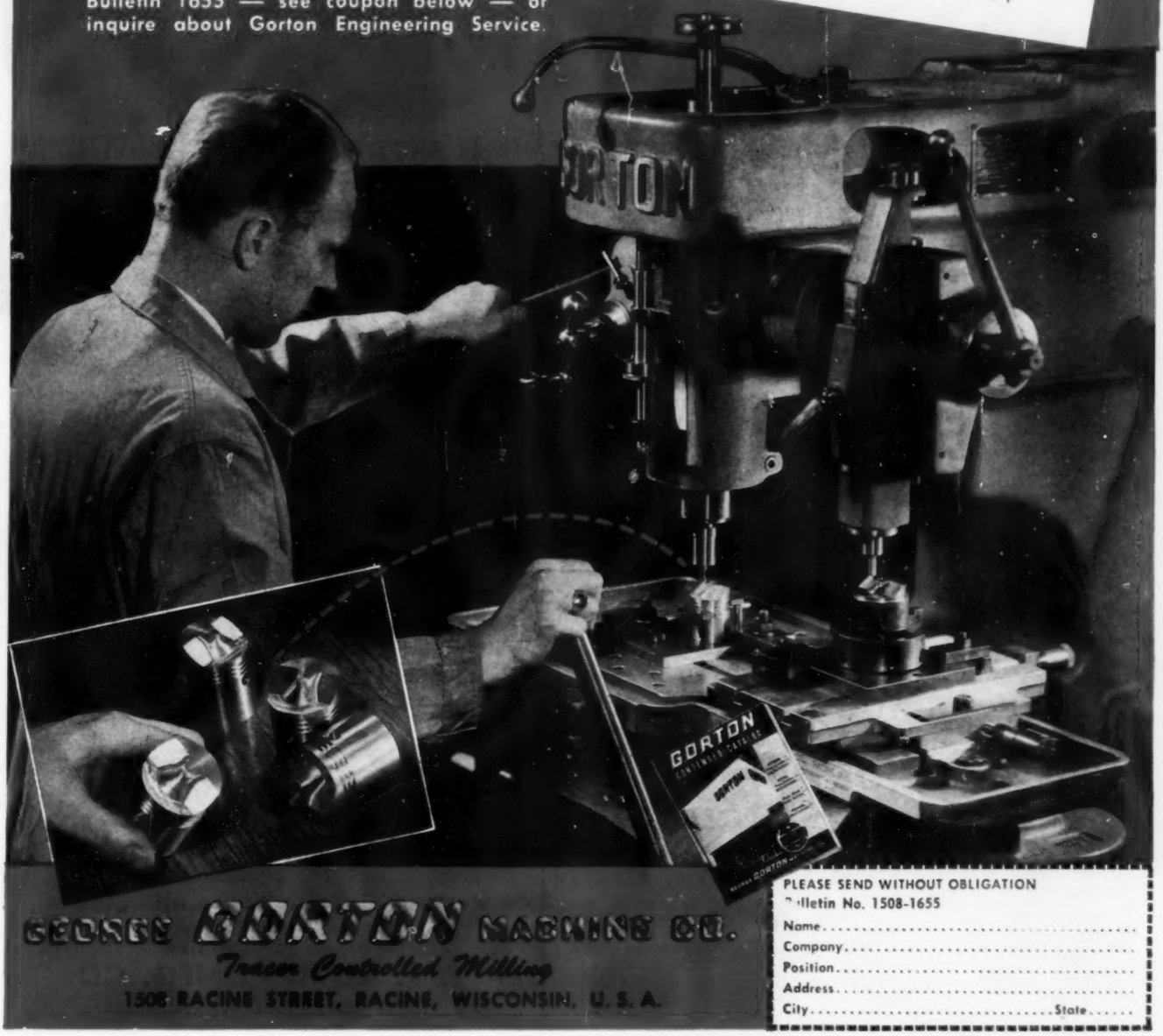
SPEED 4560 R.P.M.

NO. OF PIECES 20

SET-UP TIME 4 hours

TIME TO FINISH 6 hours (all 20 pieces)

REMARKS Minimum hand work required. Same cutter and stylus used throughout. Dia. of pistons 2". Max. depth of cut 15/32".



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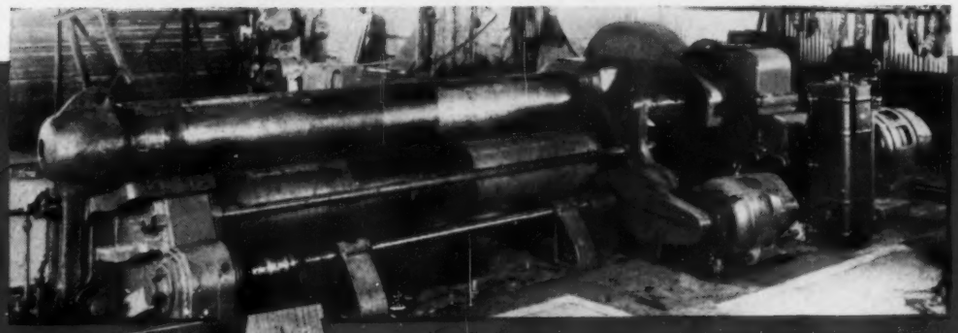

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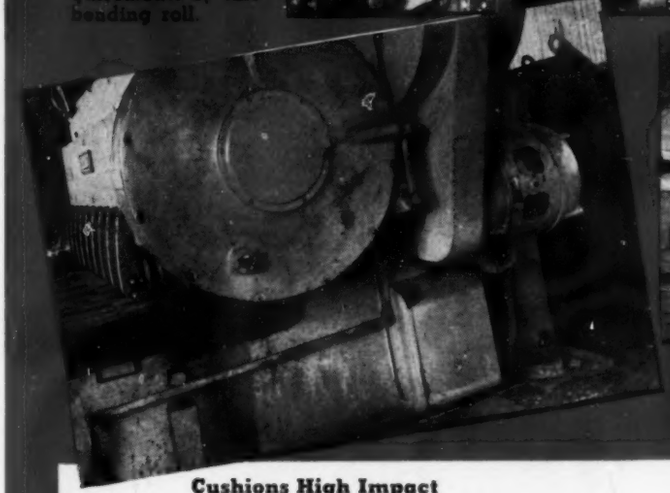
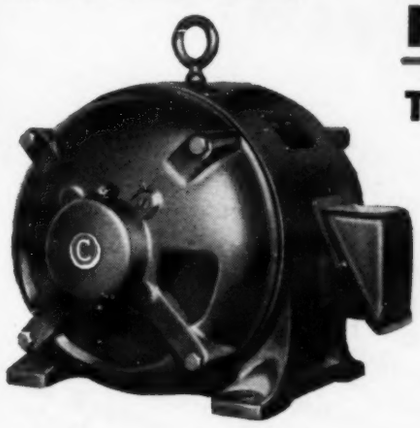
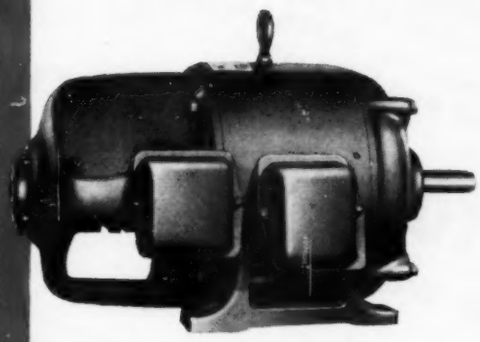


Provides Smooth Continuous Power — Century 2 horsepower SC motor supplies power for this steel cutoff saw.

Cushions High Impact Loads — Century 40 horsepower SCT motor slows down, cushions the impact of shearing or forming.





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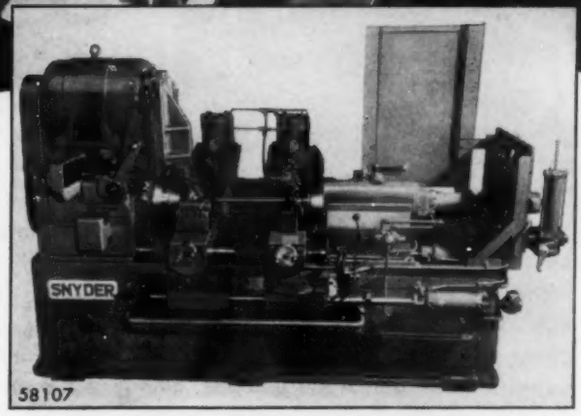

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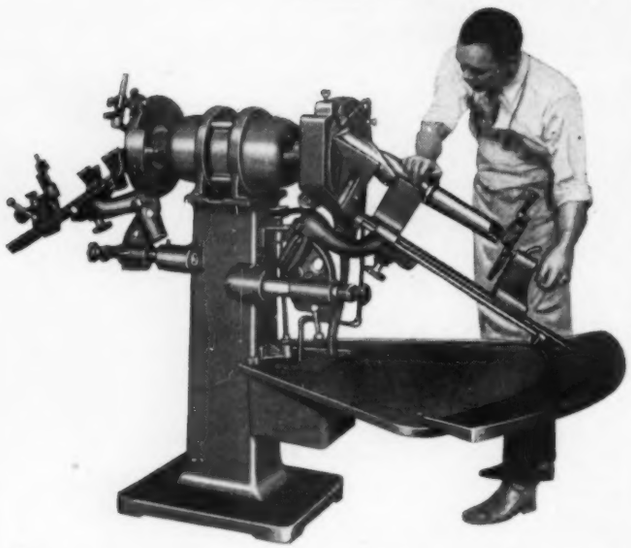

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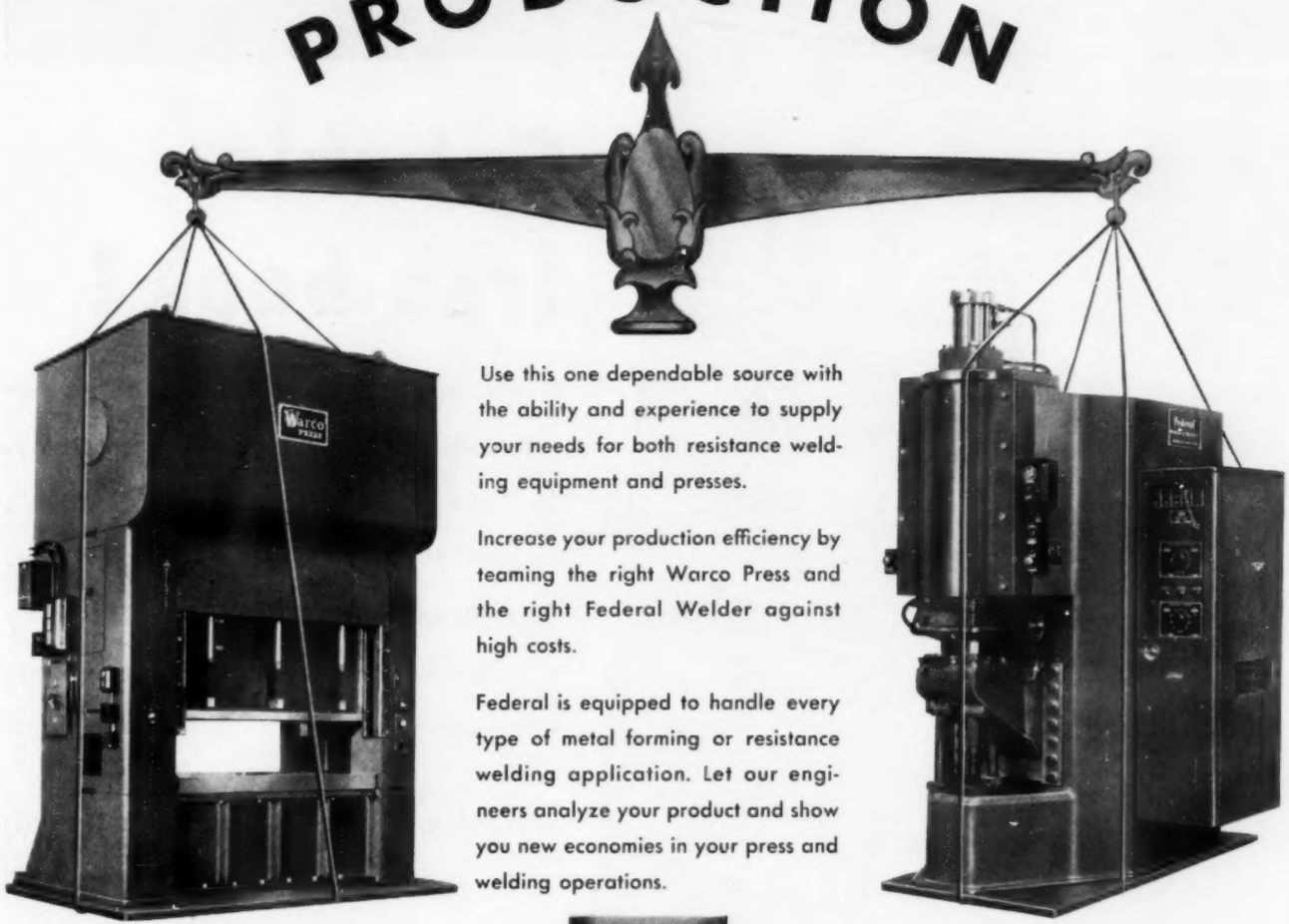

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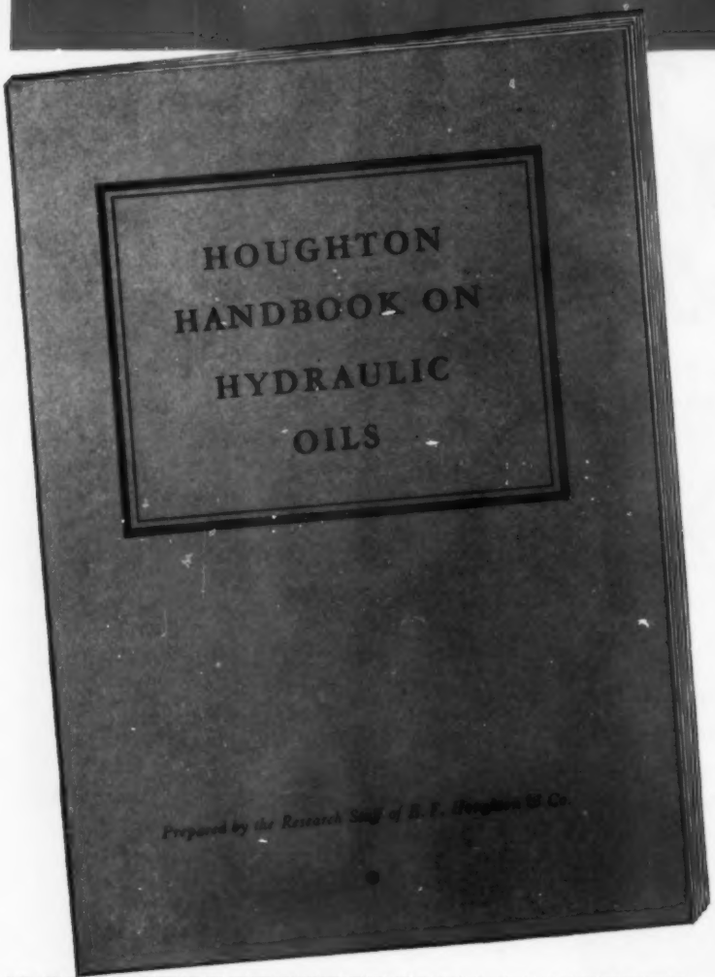

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Five chapters deal with the qualities demanded of a good hydraulic oil, and why. Two chapters are devoted to Houghton's treated HYDRO-DRIVE Hydraulic Oils. This 48-page handbook merits the study of your department heads concerned with hydraulic problems.

Houghton, through its Packings Department, also supplies VIM Leather and VIX-SYN Synthetic rubber packings to hold hydraulic pressures. What's your plant problem in this hydraulic age?

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Please forward my copy of the hydraulic oil book.

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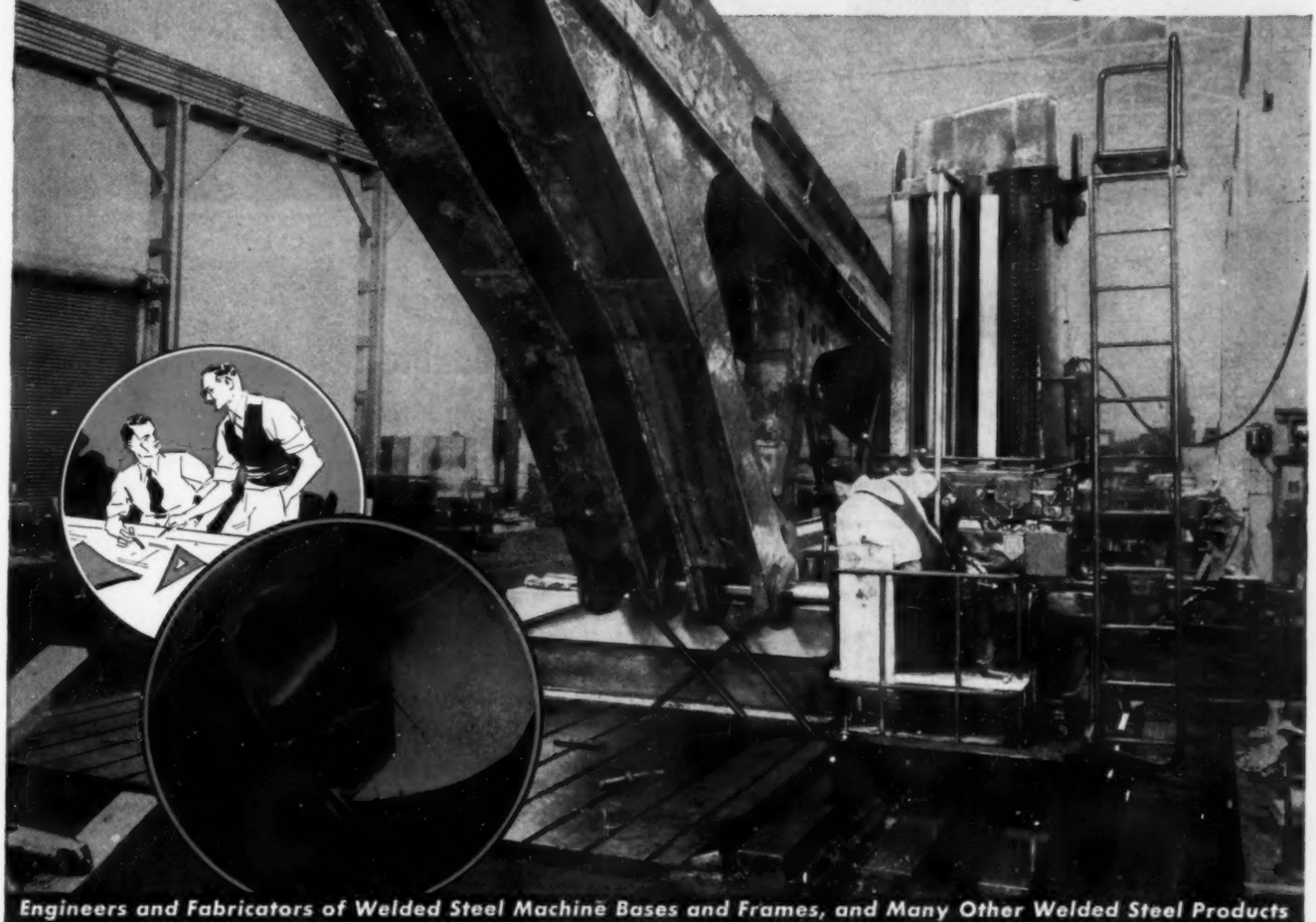
Steel-Weld FABRICATION

The Mahon Company stands ready to meet your requirements in welded steel regardless of size, weight or shape. A staff of design engineering experts, backed by highly skilled craftsmen, is your assurance of a better, smoother appearing job embodying every advantage of Steel-Weld Fabrication. Complete machining facilities, within the Mahon organization, include equipment especially adapted to handle heavy, cumbersome work of any type. If you have procurement or fabricating problems, Mahon Steel-Weld Fabrication may be the answer.

THE R. C. MAHON COMPANY
Detroit 11, Michigan



Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

MAHON

ROTO-MATICS

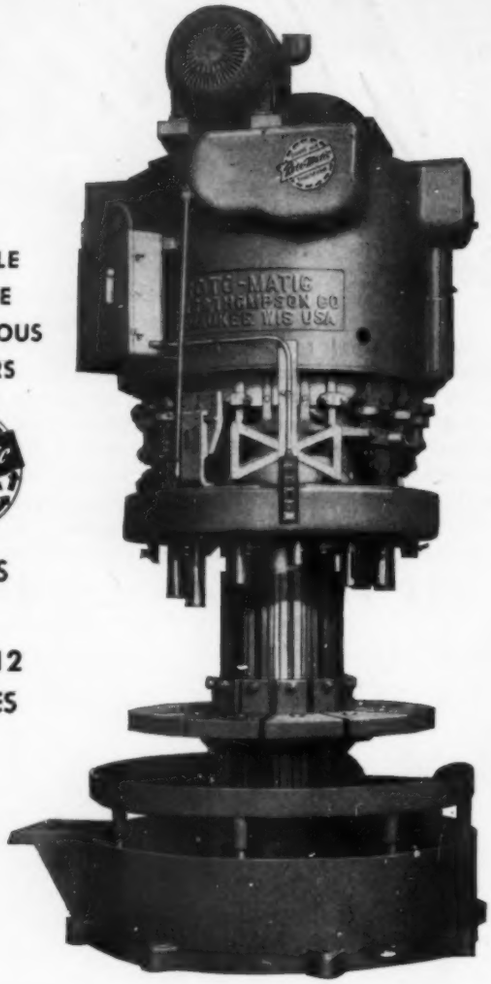
VERTICAL

MULTIPLE SPINDLE CONTINUOUS DRILLERS

DAVIS and THOMPSON Roto-Matic

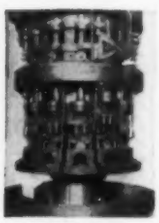
3 SIZES

6-8 OR 12 SPINDLES

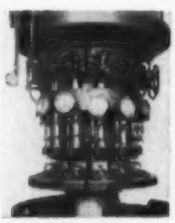


One Vertical ROTO-MATIC will equal the production of a whole battery of single spindle drillers with a proportionate reduction in labor and maintenance costs.

Where production demands fall below the capacity of the machine, on a single part, interchangeable fixtures can be designed for a variety of jobs. Where two operations are required on a single piece, requiring the same feeds and speeds, spindles can be arranged to give you the proper ratio of production.



2 SPINDLE DRILL HEADS



BALANCING OPERATION

AUTOMATIC CLAMPING

Engineering skill and thirty years of development have given us the necessary background to tool up these machines for the maximum in efficiency and accuracy of work, whether it be drilling, milling, boring, reaming, spot facing or chamfering.

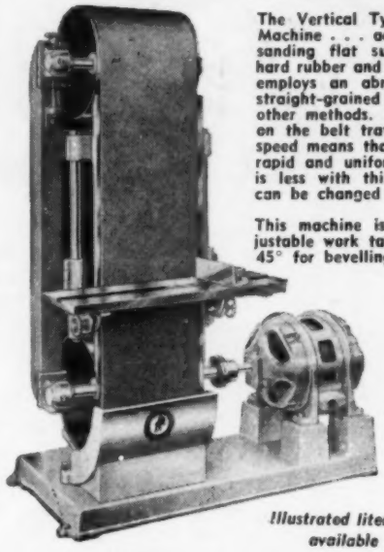
WRITE FOR BULLETIN 101.

DAVIS and THOMPSON CO.

MANUFACTURERS OF *Machine Tools*

MILWAUKEE 14, WISCONSIN

No. 4-14 "PEERLESS" Vertical Ball Bearing SURFACER gives a fine quality straight-grained finish



The Vertical Type "Peerless" Surfacing Machine . . . adaptable to grinding and sanding flat surfaces of wood, metal, hard rubber and molded compositions . . . employs an abrasive belt and gives a straight-grained finish far superior to other methods. The fact that all points on the belt travel at the same rate of speed means that cutting action is more rapid and uniform. Machine down time is less with this method because belts can be changed instantly.

This machine is equipped with an adjustable work table which may be tilted 45° for bevelling or edging.

Specifications

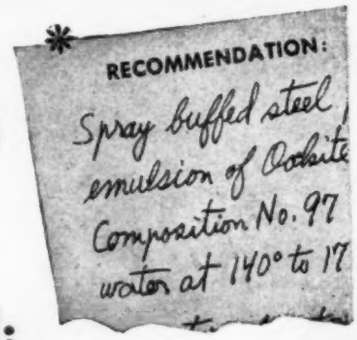
Height: 67"
Width: 50"
Depth: 35½"
Floor to Work Table: 27"
Belt width: 14"
Belt length: 11'1"
Drums: 15" dia.; 15" face
Table: 15⅝"x35"
Motor: 3 H.P.

Illustrated literature giving full details available promptly on request.

See our exhibit—Space 1327—National Metal Exposition, Phil., Oct. 25-29

Production MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

For every metal-cleaning job there is an efficient Oakite method:



Precleaning in tanks . . .* in machines . . .
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FOR MORE INFORMATION about these and other processes—burnishing, anti-rusting, treating water in paint spray booths, providing coolant and lubricant for machining and grinding—consult the Oakite Technical Service Representative in your vicinity or write to Oakite Products, Inc., 24 Thames St., New York 6, N. Y.

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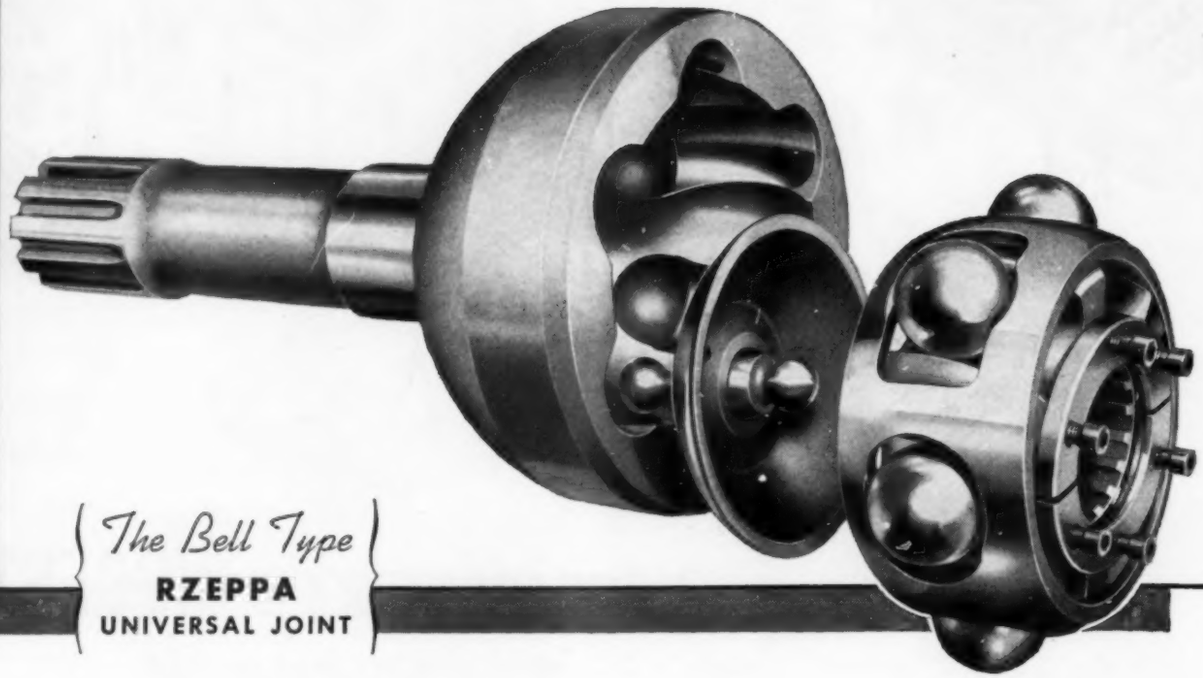
● Your industry's biggest trade show isn't a once-a-year event. It comes to you with *every single issue* of this magazine. And, because it is scheduled so frequently, it can bring you a continuing series of up-to-the-minute "displays." In these advertising pages, you will find the latest news about products and services that are specially designed to help you do your job better, quicker, and cheaper. To be well-informed about the latest developments in *your* industry . . . and to stay well-informed . . . *read all the ads too.*

American Machinist

HEADQUARTERS FOR INDUSTRIAL INFORMATION

Constant Velocity
UNIVERSAL JOINTS



The Bell Type
RZEPPA
UNIVERSAL JOINT

This is a highly efficient universal joint having constant velocity characteristics, designed for use in driving front or rear axles.

No longer are compensating double joints of the Cardan type needed to prevent torsional vibration in driving axles or in high speed propeller shafts, thus simplifying design problems.

Our constant velocity joints are manufactured in both the high angle "Bell" and the low angle "Disc" types, varying in size from ⅞ to 2½ inches nominal shaft diameter and in a variety of standard models suitable for automotive, aviation, marine and industrial applications.

Well over two million Rzeppa joints in use have merited an excellent service record.

The mechanical principles by which the Rzeppa Joint transmits vibrationless, constant, uniform power are discussed in a booklet that will be sent you upon request. The booklet illustrates the destructive forces set up by older types of universal joints when operating at various working angles, in contrast to the vibration-free action of Rzeppa Joints.

The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH., U.S.A.

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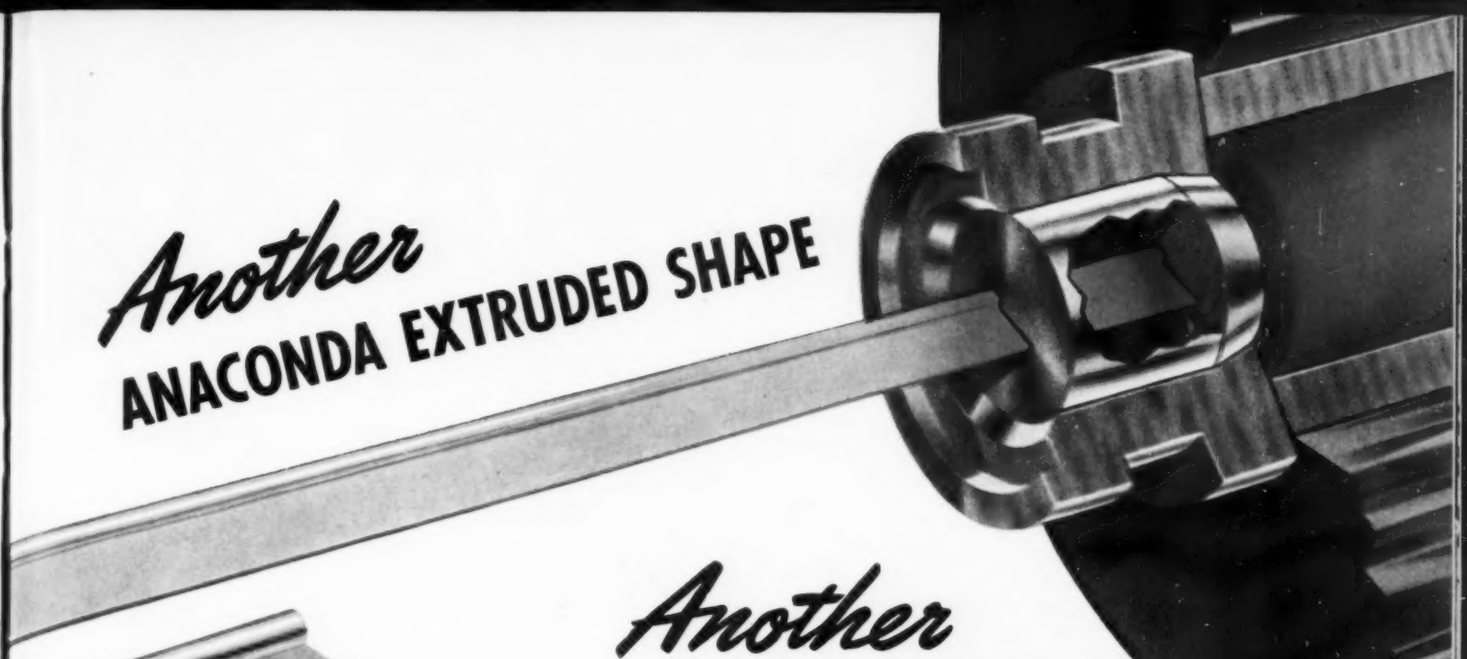
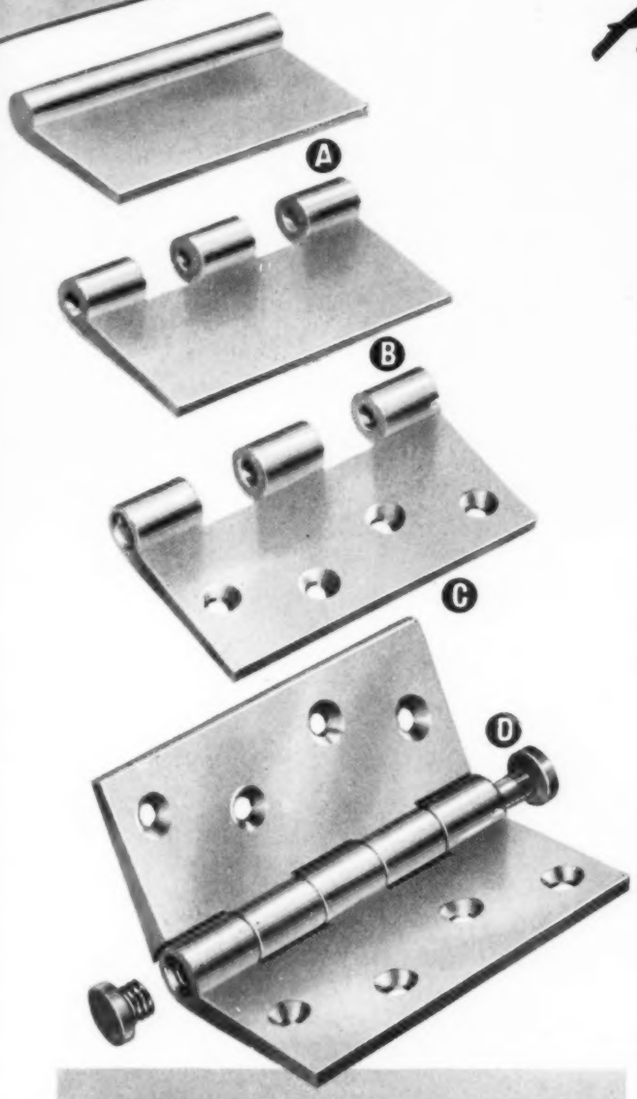
Illustrates the complete line of Rzeppa Constant Velocity Universal Joints.

Another ANACONDA EXTRUDED SHAPE



Another SHORTCUT TO A FINISHED PRODUCT



About the Extrusion Process . . .

An electric furnace billet of copper, brass, bronze or special copper alloy is heated to an accurately predetermined temperature and inserted in an extrusion press. Tremendous pressure is then applied by an hydraulic ram. Plastic resistance of the billet is overcome and the metal is squeezed through the die, conforming to the die shape in the minutest detail.

Time and again, manufacturers in many branches of industry have reported on the production advantages made possible by using an Anaconda Extruded Shape to replace an intricately formed or hard-to-make part.

One report comes from the H. S. Getty Co., Inc., of Philadelphia, prominent manufacturer of *extruded* butt hinges for marine joiner and contract builders' hardware. Let's take the 3½" Getty Button Tip Hinge illustrated as an example:

Supplied in long mill lengths by The American Brass Company, the extruded shape is first cut into hinge blanks of required size (A); then slots are milled and pin holes are drilled in the knuckles (B); next, the leaves are drilled and countersunk for screw holes (C); and finally, the nested leaves are fitted for assembly (D).

The result? A simplified shop production routine that eliminated several costly machining and finishing operations—because the extruded shape has the exact cross-section of the finished hinge. And, because of the dimensional accuracy of extruded shapes, each part is instantly adaptable to drill jigs and milling fixtures. Best of all, these extruded hinges are a precision product . . . rustless, better-looking, competitively priced and hence more readily marketable.

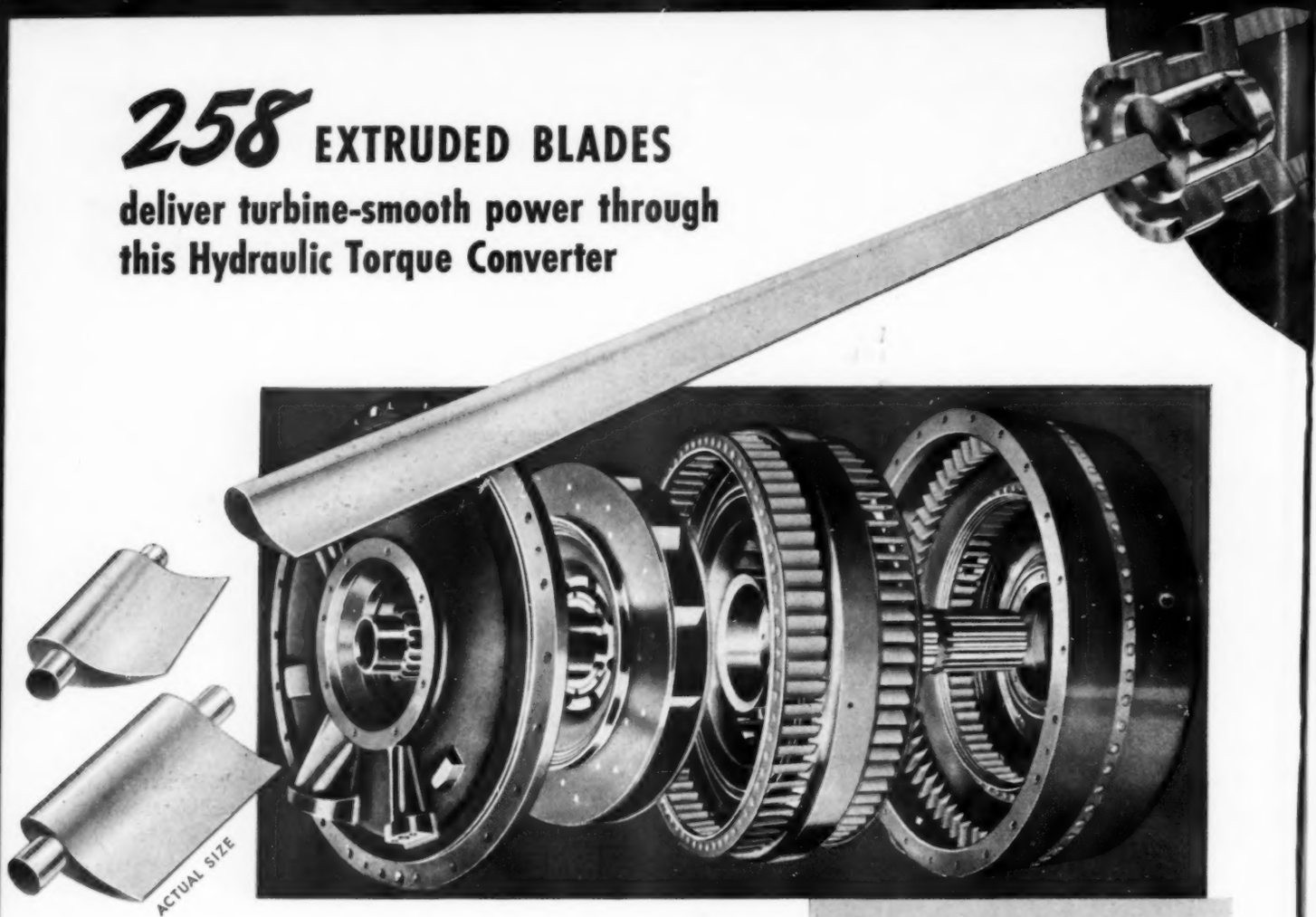
Remember, extruded metal is *wrought* metal . . . tough, strong dense-grained, smooth-surfaced and easy to machine. If the production possibilities of extruded shapes look promising to you, send us a sketch, sample or description of the part you have in mind. We'll be glad to tell you about costs . . . and possible *savings*, too.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

258 EXTRUDED BLADES

deliver turbine-smooth power through this Hydraulic Torque Converter



SEVERAL forward strides in the automotive field have been made through the development of the Spicer Hydraulic Torque Converter. These include: (1) Smooth and rapid acceleration, through hundreds of horsepower, by simply stepping on the gas pedal. (2) Greater passenger comfort, less wear and tear, and longer engine life due to reduced vibration. (3) Elimination of strain and fatigue on the driver caused by continuous clutching and gear shifting—particularly on buses and trucks.

This torque converter built by Spicer Manufacturing Division, Dana Corporation, Toledo, Ohio, has been accepted as a highly efficient and practical transmission unit and is now in volume production. A brief explanation of its operation appears at the right . . . where it becomes evident that the brunt of the power is borne by 258 high-strength, turbine-like blades of Anaconda Brass.

A lot of engineering went into the development of precise form and facial curvature of these blades—which are cut from long mill lengths of Anaconda Extruded Shapes—each blade having the dimensional accuracy and surface smoothness of the die through which it was extruded.

Extruded Brass is a readily machinable metal, so trunnions are quickly milled on both ends of the blade. Being a tough metal, too, the trunnions are riveted to the rotor or stator for keeps . . . each blade in the exact location and at the correct angle.

This is a new application for Anaconda Extruded Shapes . . . thousands of similar shapes, in copper and various copper-base alloys, are in daily use. A brief description of their method of manufacture appears on the preceding page.

And this is the way it works . . .

The pump of the Spicer Hydraulic Torque Converter is driven by the engine. Operating on the principle of a turbine, a large volume of fluid, at very high speed, is forced against the first set of blades of the driven rotor. This first set of blades reverses the direction of the oil and forces it through a set of stationary blades in the housing. The oil is again reversed, and this process is repeated through a second set of rotary blades—a second set of stationary blades—and then a third set of rotary blades, after which the fluid is returned to the pump.

An idea of the force delivered can be gained from the fact that the flow, at times, reaches a rate of 5,000 gallons a minute—almost two large barrels every second!

49116

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: Anaconda American Brass Ltd.,
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ANACONDA
from mine to consumer

Anaconda
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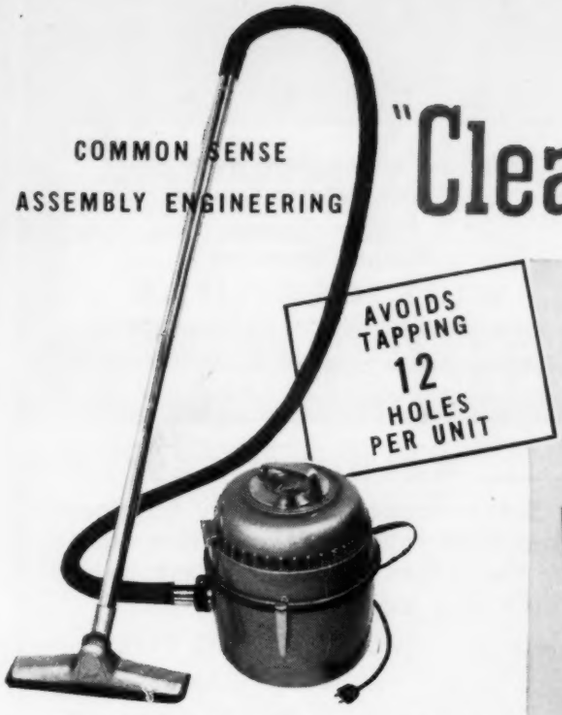
COMMON SENSE
ASSEMBLY ENGINEERING

"Cleans up" 50% saving!



THE LEWYT CORP. wisely questioned fastenings used in this multi-purpose vacuum cleaner — found they could use the simpler P-K method and make assembly savings of 50%.

A P-K Assembly Engineer made a thorough study, helped Lewyt engineers eliminate 12 tapping operations, many in hard-to-get-at places. The P-K Screws specified also add fastening strength — an important feature in a product that must stand up under many years of frequent — often rough — use by busy housewives.

Why not find out if you can start operations several steps closer to the finished assembly by using P-K Self-tapping Screws. It's plain common sense to begin making savings you've been missing — often up to 50% — in work hours now wasted by needless tapping, bolting, riveting, or inserts in plastics.

Plan now to call in a P-K Assembly Engineer to check your assemblies. If you prefer, mail assembly details for recommendations. Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.

Sold Only Through Accredited Distributors

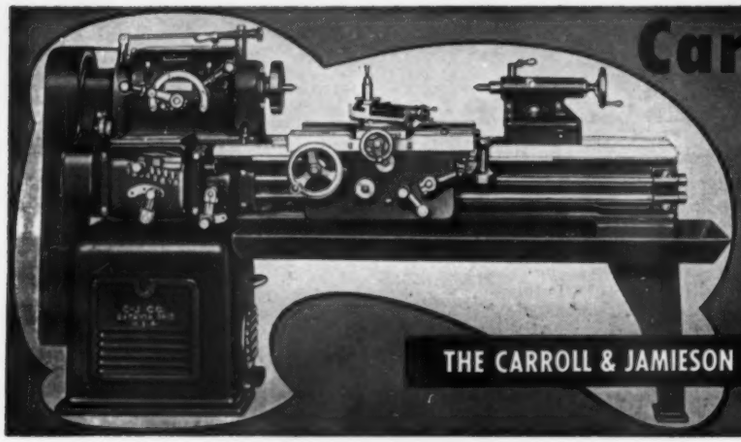
In this **LEWYT VACUUM CLEANER,** four P-K Type "F" Self-tapping Screws fasten the sheet metal fan housing to the die-cast outer shell. Two P-K Type "F" Round Head Screws fasten the sheet metal cover lock to die cast cover. Two P-K Type "F" Oval Head Screws fasten sheet metal nozzle plate to die-cast brush assembly. Four P-K Type "F" Phillips Recessed Head Screws fasten die-cast cover plate of brush nozzle to die-cast brush nozzle body.

P-K® *The Original*

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

PARKER-KALON SELF-TAPPING SCREWS

OTHER PARKER-KALON PRODUCTS COLD-FORGED SOCKET SCREWS • HARDENED SCREWNAILS AND MASONRY NAILS • SHUR-GRIP FILE AND SOLDER IRON HANDLES • METAL PUNCHES • DAMPER REGULATORS AND ACCESSORIES



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12 Speed Geared Head Motor Drive
Timken Mounted Spindle
Modern Design—
Liberal Dimensions
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THE CARROLL & JAMIESON MACHINE TOOL CO., BATAVIA, OHIO, U. S. A.

This Grand Rapids No. 20 Motor Driven Hand Feed Surface Grinder can, in many instances be used more profitably than the more costly Hydraulic Feed Surface Grinders . . . and we make both types.

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Manufacturers of Grand Rapids Grinders
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The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

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KAUFMAN MFG. CO.
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DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

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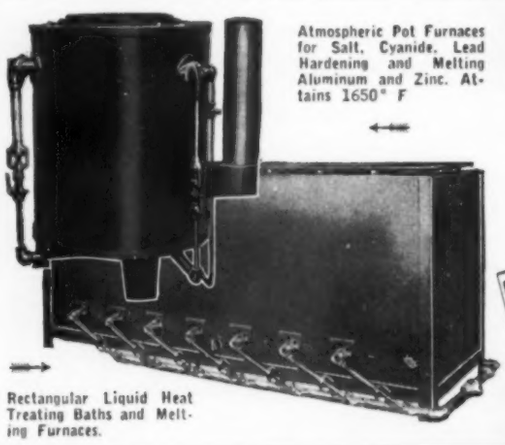
DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.



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Rectangular Liquid Heat Treating Baths and Melting Furnaces.

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All "BUZZER" Industrial Gas Furnaces are rugged in construction, efficient in design, economical in operation and fully insulated.

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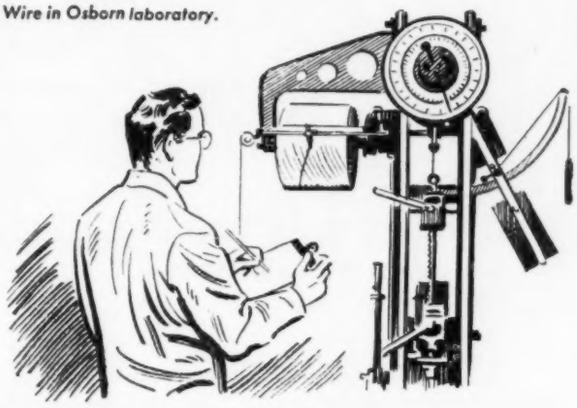
CHARLES A. HONES, INC.
121 South Grand Avenue, Baldwin, L. I., N. Y.

It pays to buy *top quality* wire wheel brushes

Here's why OSBORN BRUSHES give lowest end-of-cost service

Continuous factory inspection from wire to finished brush.

Testing Wire in Osborn laboratory.



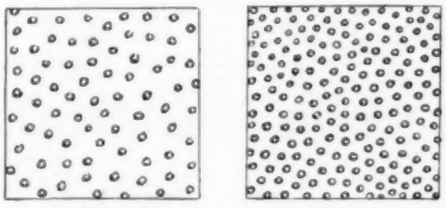
TOP QUALITY CONSTRUCTION

High operating speeds of modern equipment permit no compromise in quality of brush construction. Osborn Brushes are made to exclusive patented designs which hold wire securely in the hub of the brush. Density of wire, evenness of trim, and balance are other vital factors on which Osborn has rigid specifications for every brush in their line. Efficient manufacturing controls at every step in production insure adherence to these quality standards.

Complete line of product assures right brush for every job.

TOP QUALITY WIRE—AND PLENTY OF IT

Remember, brushes are tools. All wire used by Osborn is made to specifications for a specific brush service. Every lot is laboratory tested to make certain that it measures up to these rigid standards. First cost? More, to be sure, but the last cost to you is less in the form of longer brush life and better brush service.



Ordinary wire wheel brush

Osborn Brush—more wire ends to do more work faster.

Ever count the number of wires making up a square inch of brush surface? It's the cutting ends that do the work. More ends per square inch mean faster operation and longer brush life. Osborn gives you full measure of the right wire for every brushing service.

TOP QUALITY SERVICE

Osborn wire wheel brushes are tools and are sold as such. There are many applications—cleaning, removing burrs, roughing, finishing, polishing—and every one calls for the right brush for the job. Osborn makes a complete line of brushes and sells them through men who know where and how they can be applied to your maximum advantage.

Yes, top quality pays off all along the line. If you want to get the best out of wire wheel brushes, it will pay you to buy from the manufacturer who puts the best into them. Write today for the name of your local Osborn distributor.

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue *Cleveland, Ohio*

Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY • POWER DRIVEN BRUSHES • PAINT BRUSHES • MAINTENANCE BRUSHES

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THE ABBOTT BALL COMPANY HARTFORD, CONN. U.S.A.
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29 30 31
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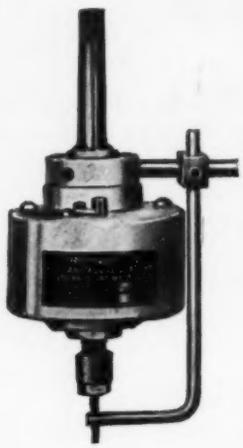
BEST
TO SPECIFY
. . ANY TIME

THE ABBOTT BALL COMPANY
HARTFORD 10, CONN.

CUT SMALL HOLE TAPPING COST



With the *new* and *improved* ERRINGTON "Cushion" Cone High Speed Tapper with the 2:1 reverse.

Ball & Bronze bearing throughout.

Taps to 3/16 in steel, ¼ in cast iron.

Also: Multiple drilling & tapping attachments, auto opening dieheads, clutch tappers to 2" taps.

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Main Office & Wks.: STAPLETON, S. I. 4, N. Y.
Established 1891

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FEEDS
AUTOMATIC EQUIPMENT
THE V & O Press Co.
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Severance CARBIDE MIDGET MILLS
Operate at grinding-wheel speeds
Outlast scores of mounted points
Cut 50 times faster
MANY SHAPES and SIZES
Cut hard materials - Rockwell 65-C
Write for Catalog No. 16
May be REGROUND time-after-time by Severance—savings are thus multiplied
¾ SIZE
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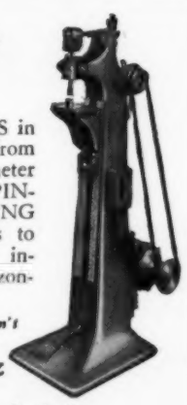
GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ⅝" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.



THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

Gets cutting-oil results with soluble oil economy

Are you looking for a soluble oil that will handle more of your cutting operations . . . reduce costly use of special cutting oils? Here's evidence that Stanicool HD Soluble Oil will give you just such versatile service.

The spindle shown above was machined from 1035 hot-rolled steel. The job required a cut 10 inches long and 1¼ inches deep.

For this heavy job a special cutting oil was used, although Stanicool HD Soluble Oil was giving satisfactory service on several other operations. In an attempt to reduce costs, Stanicool HD was tested for machining this spindle. It worked! Spindle production was equal to that obtained with the special cutting oil. Finish was highly satisfactory, tool life excellent. Because of its composition, Stanicool HD can handle a wider variety of your machine operations than conventional soluble oils. A Standard Cutting Oil Specialist is available to help you obtain the most economical use of Stanicool HD. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Stanicool HD Soluble Oil

Machinery manufacturers Claude Goulding (left) and James Goulding (right) examine one of the spindles produced on the turning operation above. They are especially pleased with the advantages of using Stanicool HD Soluble Oil on this job.

STANDARD OIL COMPANY (INDIANA) STANDARD

NOW, GREASES THAT RESIST BOTH HEAT AND WATER

WERE YOU ever faced with the problem of lubricating bearings which operated under extremely wet conditions and, at the same time, were subjected to widely varying temperatures? If so, you probably had to choose between a high-temperature grease with poor resistance to water or a water-resistant lubricant with only fair resistance to heat.

Standard Oil's new Stanolith greases end all need for compromise. A lithium soap grease has unusual characteristics which conventional soda soap or lime soap greases cannot duplicate. Stanolith greases resist the washing action of water because they are insoluble in water and also are extremely adhesive. They resist heat because they are made from an extremely stable base oil and a high-melting point soap, and contain an oxidation inhibitor.

Where you have a heat-and-water problem or where costly machines demand the best possible lubrication, try Stanolith. A Standard Oil Lubrication Engineer will help to make a test. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Performance Characteristics of Stanolith Greases

- operate over a wide range of temperatures—have high dropping points.
- have excellent water resistance.
- have unusual mechanical stability—a minimum of oil evaporation and separation.
- contain effective oxidation inhibitors.
- are corrosion resistant.

Two grades of Stanolith Greases are available: No. 42—with a No. 1 consistency, and No. 57—with a No. 2 consistency.

STANDARD OIL COMPANY (INDIANA) STANDARD

FREE LITERATURE

(Not good after October 1, 1948)

New Catalogs, Booklets, Bulletins

MACHINES AND ATTACHMENTS

1 TURRET LATHES, AUTOMATICS, TAPPING MACHINES—The Warner & Swasey Co., Cleveland, Ohio. 32-page catalog illustrates and describes company's entire line of machine tools, covering the ram, saddle and electro-cycle turret lathes, the single- and multiple-spindle automatics, the precision threading and tapping machines, and the geared scroll chucks.

2 LATHES — Clausing Manufacturing Co., Ottumwa, Iowa. 16-page bulletin 48 gives design and construction features of Clausing precision lathes. Specifications are included. Various attachments are described.

3 MILLING, BROACHING, GRINDING—The Cincinnati Milling Machine Co., Cincinnati Grinders, Inc., Cincinnati 9, Ohio. 44-page catalog M-1646 covers company's line of milling, broaching, cutter sharpening, grinding, lapping, and flame-hardening machinery. Illustrations and specifications are given throughout.

4 DIE-CASTING MACHINES — The Cleveland Automatic Machine Co., Cincinnati 12, Ohio. 4-page bulletin illustrates and describes the Cleveland Die-Casting machine, Model 200, a universal high-pressure hydraulic die-casting machine incorporating automatic timing.

5 CYLINDRICAL GRINDING MACHINE—The Landis Tool Co., Waynesboro, Pa. 16-page bulletin B-45 covers the Landis 6-in. type CH plain hydraulic cylindrical-grinding machine. Automatic visual sizing and grinding with the wheel base set at an angle makes practical the grinding of a diameter and an adjoining face at the same time.

6 AIR-HYDRAULIC EQUIPMENT — Bryant Products Distributing Co., Jackson, Mich. 8-page bulletin covers Bryant air-hydraulic equipment including their A-H presses, impact hammer, exhaust valves, 4-way valves, Presvise and mufflers. Drawings and specifications are included.

7 ABRASIVE-BELT MACHINE, PORTABLE ELECTRIC TOOLS — The Porter-Cable Machine Co., Syracuse 8, N. Y. 20-page booklet describes line of abrasive-belt machines as well as company's portable electric tools. Included in the pocket-size booklet is a description of large abrasive machine tools with automatic feed table, centerless belt grinder, toolroom surfacers and smaller bench-type abrasive-belt models.

8 PUNCH PRESS—Diamond Machine Tool Co., Los Angeles 23, Calif. 12-page catalog gives specifications and technical engineering data on the Diamond open-back inclinable punch presses. Also included are photographs and engineering data on SR-4 strain-gage analysis and dynamic heads as applied to Diamond punch presses.

9 SPINDLES—Pope Machinery Corp., Haverhill, Mass. 64-page catalog 58, spirally bound, covers heavy-duty precision motorized spindle and matching wheel holder or cutter head. The heavy-duty P-2500 series spindles are equipped with sealed in lubrication and cover a range from ¾ to 20 hp., and from 900 to 3600 rpm.

10 GEAR SHAVING—National Broach and Machine Co., Detroit 13, Mich. 20-page bulletin covers the Red Ring Gear Shaving Process. Bulletin is fully illustrated and drawings are included.

11 MULTI-SLIDE, MULTI-MILLERS —U. S. Tool Co., Inc., Ampere, East Orange, N. J. 20-page bulletin covers company's line of multi-slide machines, multi-millers and automatic press-room equipment. Specifications are included.

12 PLASTICS-MOLDING MACHINES —The Hydraulic Press Mfg. Co., Mount Gilead, Ohio. 6-page pamphlet gives detailed description of the H-P-M injection-molding machine. The functions of mold clamp, material feed, injection unit, heating chamber, movable diehead, and operation systems are discussed.

13 HYDRAULIC STRAIGHTENING PRESSES—Colonial Broach Co., Detroit 13, Mich. Bulletin PS-48 illustrates and describes line of hydraulic presses for straightening both rough and finished work. Included is the Model PS-75-12 straightening press with a 75-ton capacity and a 12-in. stroke.

TOOLS AND ATTACHMENTS

14 CEMENTED-CARBIDE TOOLS — Kennametal Inc., Latrobe, Pa. 68-pg. catalog 48 covers Kennamatic cemented-carbide tools which are available in five styles having indexable and replaceable solid-Kennametal inserts. Other products are included such as index tools, planer tools, and roll-turning tools.

15 TOOLS FOR BORING AND TURNING—Microbore Co., Ferndale 20, Mich. 6-page folder illustrates and describes the Microbore, a tool for precision boring, turning, and facing operations. Adjustment is said to be possible to 0.0001 on the diameter. It can be applied in single- or multiple-stations for roughing or finishing.

16 CARBIDE-TOOL GRINDERS — Willey's Carbide Tool Co., Detroit, Mich. 4-page folder covers Willey's Model 50-A carbide-tool grinder equipped for wet and dry grinding. The model handles rough, semi-finish, and finish grinding of toolbits ranging up to a maximum of 2-in. square or equal cross-section area.

17 COMBINED BORING, FACING TOOLHEADS—Chandler Tool Co., Muncie, Ind. 8-page pamphlet contains information on the Chandler-Duplex combined boring and facing toolheads, featuring power feed for facing cuts.

18 NOTCHING UNITS—Wales-Strippit Corp., North Tonawanda, N. Y. 16-page catalog illustrates and describes the Wales units used for notching sheets and angles. Units are independent and self-contained with nothing attached to the press ram, providing rapid setup in stamping presses and press brakes for long or short runs. The units can be used for notching mild steel up to ⅛ in. thick.

19 SINGLE-POINT BORING, FACING TOOLS—Bokum Tool Co., Detroit 21, Mich. 4-page folder lists specifications of internal cutting tools. The No. 00000 style A boring tool allows boring of 1/16-in. holes. An added size to the Style B permits facing and bottoming of holes 1/16 in. in diameter.

20 INTERNAL COMPARATORS — Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn. 16-page catalog illustrates and describes the Electro-limit internal comparators, for gaging the internal diameter of parts. Varied models are covered.

21 SCIENTIFIC INSTRUMENTS — American Instrument Co., Inc., Silver Spring, Md. 274-page catalog 48 describes numerous scientific instruments for use in chemical, biological, physical, metallurgical, engineering, and materials-testing laboratories.

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22 EJECTOR-TYPE TOOLS — Super Tool Co., Detroit 13, Mich. 12-page bulletin 348, covers the 20 styles of ejector-type tools. Bulletin describes both horizontal and vertical types, illustrates the variety of cuts possible, and includes grinding instructions.

23 BORING TOOLS—Wendt Sonis Co., Hannibal, Mo. 8-page folder covers the Criterion line of boring-head sets, boring tools, toolmakers vise, and fly bars.

24 SPEED CONTROLS—Reeves Pulley Co., Columbus, Ind. 12-page folder illustrates and describes the Reeves speed control, its application, and its operating principles. Three distinct basic models and four types of controls are offered.

WELDING AND HEAT TREATING

25 INDUCTION HEATERS — Allis-Chalmers, Milwaukee, Wis. 12-page bulletin 15B6430A illustrates and describes Allis-Chalmers heaters ranging from 1 to 100 kw. in size. Examples of brazing, soldering, hardening, annealing and heating with these induction heaters are given.

26 SPOT WELDING OF ALUMINUM ALLOYS—P. R. Mallory & Co., Inc., Indianapolis, Ind. 36-page bulletin contains 14 chapters covering all phases of spot welding of aluminum alloys among which are sections on surface-preparation equipment, techniques, and testing of spot welds.

27 RESISTANT-WELDING ELECTRODES—Ampco Metal, Inc., Milwaukee 4, Wis. 24-page bulletin 68, revised edition, covers resistance-welding electrodes and alloys. It includes water-cooled ejector-type holders, and new welder tips and accessories.

PLANT SERVICE EQUIPMENT

28 PLATING EQUIPMENT — Meaker Co., Chicago 50, Ill. 36-page booklet 148, describes the Meaker design of automatic, semi-automatic, and special machines for plating and other sequence processing. Illustration shows the different type machines.

29 SAFETY EQUIPMENT — The Chicago Eye Shield Co., Chicago 12, Ill. 64-page catalog lists company's products and tells where to use, how to use, and how to maintain industrial-protective equipment. 16 pages explains correct safety procedure.

30 ASSEMBLY BINS—The Gordon L. Hall Co., Old Lyme, Conn. 8-page folder 9 includes company's complete line of assembly bins. The booklet is intended to serve as an aid to equipment selection for motion economy programs.

31 GEAR MOTORS — Link-Belt Co., Chicago 1, Ill. 16-page Bulletin 1815, covers double- and triple-reduction units with integrally mounted electric motor in standard sizes of 1 to 30 hp. with an output-speed range of 280 to 6 rpm.

32 COMPRESSORS—Quincy Compressor Co., Quincy, Ill. 12-page bulletin WC58 covers the water-cooled Quincy compressors for continuous heavy-duty service. Illustrations and specifications are included.

PARTS AND MATERIALS

33 MOLD-RELEASE AGENTS — Dow Corning Corp., Midland, Mich. 16-page bulletin covers Dow Corning silicone mold-release agents for rubber and plastic. Information on the general properties of these products as well as major applications are included.

34 GRINDING WHEELS — United States Rubber Co., New York, N. Y. 28-page catalog covers high-speed grinding wheels used by steel mills, foundries and metal-fabricating plants. Information on the Royalite resin-bonded grinding wheels and vulcanite and Corvite rubber-bonded wheels is included.

35 CARBON-MANGANESE CARBURIZING STEEL — Joseph T. Ryerson & Son, Inc., Chicago 80, Ill. 4-page folder gives information on the free-cutting carbon-manganese carburizing steel. Steel is described as having good machinability in addition to developing hard, deep case with rugged supporting structure.

36 SILICONE PRODUCTS — General Electric, Pittsfield, Mass. 30-page bulletin CDR-57 describes in detail the G-E silicone products. Included are the silicone resins, oils, greases, water repellents, and rubber, together with many industrial uses. Charts and tables are included.

37 ALUMINUM-BRONZE AND COPPER-BASE ALLOYS — Ampco Metal, Inc., Milwaukee 4, Wis. 16-page bulletin 95 covers the Ampco line and gives information on a wide range of bronze products and alloys. Product range covers bronze rod and sheet, non-sparking safety tools, corrosion-resistant centrifugal pumps, and other products.

38 ADJUSTABLE-SPEED DRIVE — The Reliance Electric & Engineering Co., Cleveland 10, Ohio. 8-page bulletin 311, covers electrical adjustable speed V-S drives for ac circuits. The bulletin contains photographs covering 9 specific applications of the drive.

39 HYDRAULIC CYLINDERS — Lindberg Engineering Co., Chicago 12, Ill. 12-page bulletin 700 illustrates and describes the Lindberg cushioned and non-cushioned oil-hydraulic cylinders. Drawings and specifications are included.

40 PREPAINTING FERROUS METALS—Oakite Products, Inc., New York, N. Y. 6-page service report discusses the Oakite CrysCoat Process a pre-paint procedure for cleaning and surface treatment of ferrous metals, to provide improved paint adhesion.

41 PIPE COILS—Crane Co., Chicago 5, Ill. 48-page booklet 318 includes listing of types of pipe coils, materials, pipe data, engineering data, illustrations, and accessories.

42 TAPS, LUGS FOR STRANDED OR SOLID WIRE — Buchanan Electric Products Corp., Elizabeth 4, N. J. Six single sheets cover splice caps and Termend lugs for stranded and solid wire, box connectors, insulated metallic-conduit bushings, terminal blocks, and other Buchanan products.

43 UNIVERSAL JOINTS — Condenser Service & Engineering Co. Inc., Hoboken, N. J. 8-page bulletin CS-10 illustrates and describes bevel-gear universal joints. Specifications and drawings are included.

44 CERIUM METAL—General Cerium Co., Edgewater, N. J. 4-page folder gives information on cerium metal. Uses of cerium in ferrous metallurgy, copper alloys, nickel alloys, zinc alloys, aluminum alloys, and magnesium alloys are discussed.

45 INSPECTION DISKS — Latrobe Electric Steel Co., Latrobe, Pa. 8-page folder illustrates and describes hardened, polished and etched inspection disks.

46 ELECTRIC-MOTOR CONTROLS —Furnas Electric Co., Batavia, Ill. 16-page bulletin 48 covers the Furnas line of electric-motor controls. Included are reversing-drum controllers for reversible motors; multi-speed drum controllers, magnetic-reversing switch, pushbutton stations, and other controls.

47 CHUCKS — Rockford Magnetic Products Co. Inc., Rockford, Ill. 4-page folder entitled "Holding for Milling" illustrates and explains holding shafts for keyway milling with power-grip Viking chucks. It also discusses holding castings for milling, and the power-grip standard chuck for holding diversified toolroom work.

48 CALCULATOR—Sterling Bolt Co., Chicago 6, Ill. Sliding discount calculator charts varied specifications of different sized bolts. Varied type bolts are covered.

49 FIXTURE CLAMPS—Morton Machine Works, Ferndale 20, Mich. 38-page folder contains a complete set of loose-leaf tracting templets for M-T fixture clamps and precision fixture components. Specifications are included.

50 BEARINGS — The Gwilliam Co., Brooklyn 2, N. Y. 16-page catalog No. 24 lists information concerning the Gwilliam line of roller thrust bearings, ball thrust bearings, step bearings, journal roller bearings, industrial roller bearings, and special bearings. Various types are illustrated and standard sizes are listed in tabulated form.

51 ROLLER BEARINGS—Roller Bearing Co. of America, Trenton 3, N. J. Engineering data book and catalog covers company's line of products including the Cyclops and 20th Century small-diameter roller series, the bearing-industry cam-follower standard series, and the R.B.C. Cyclops roller-follower series bearings. Also covered are the conventional cage-type journal roller bearings.

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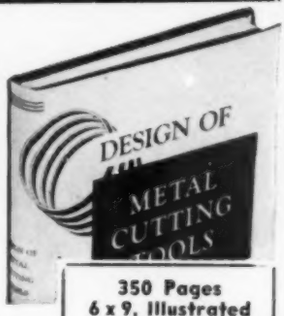

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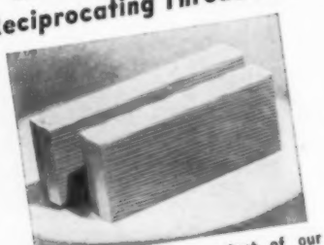

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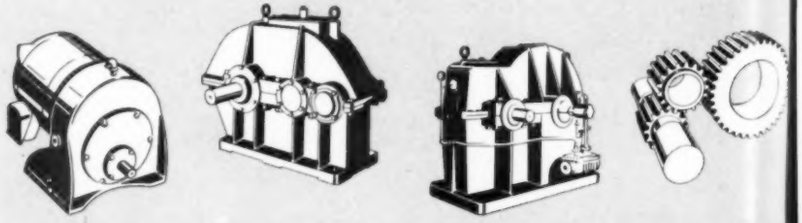

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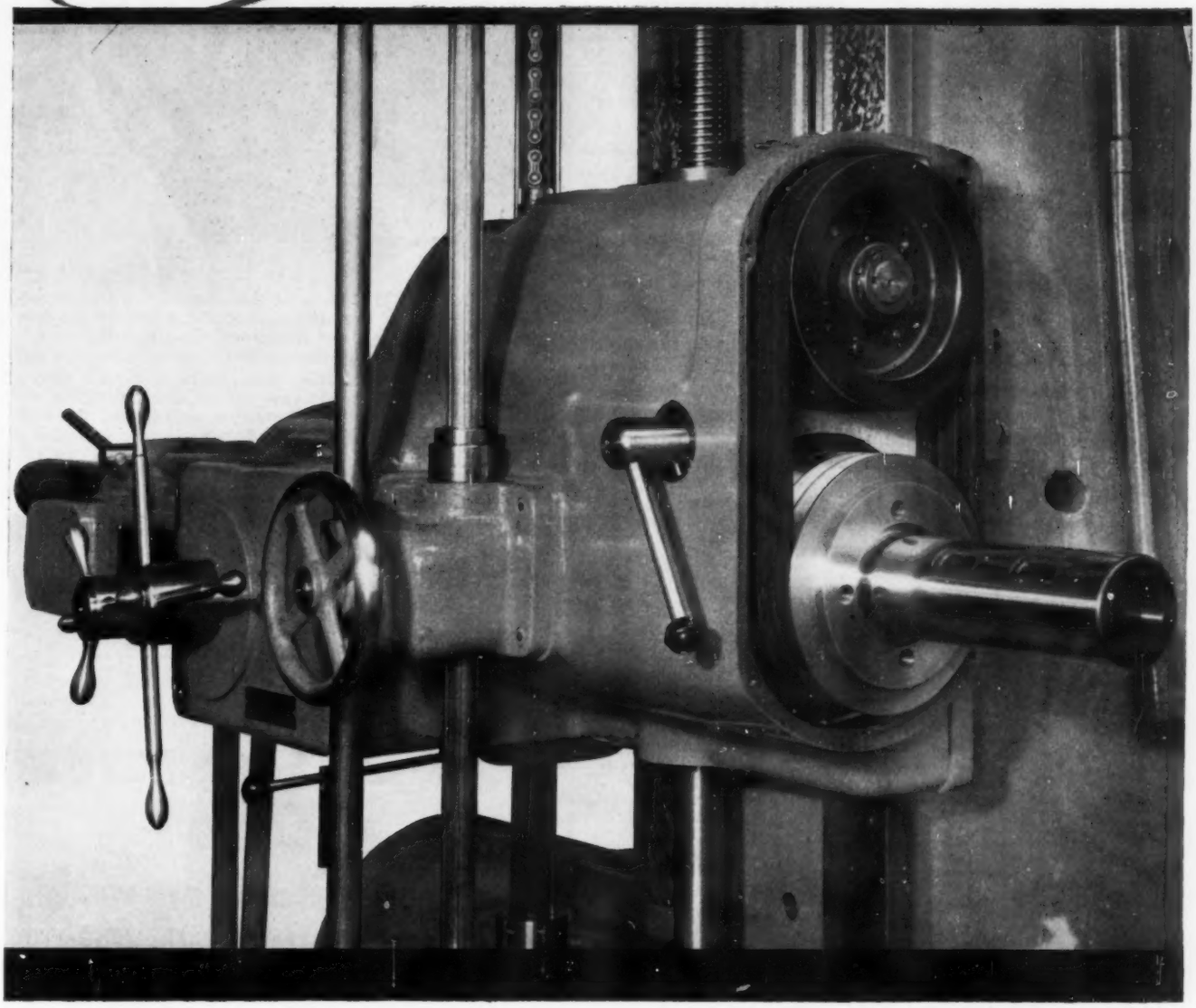

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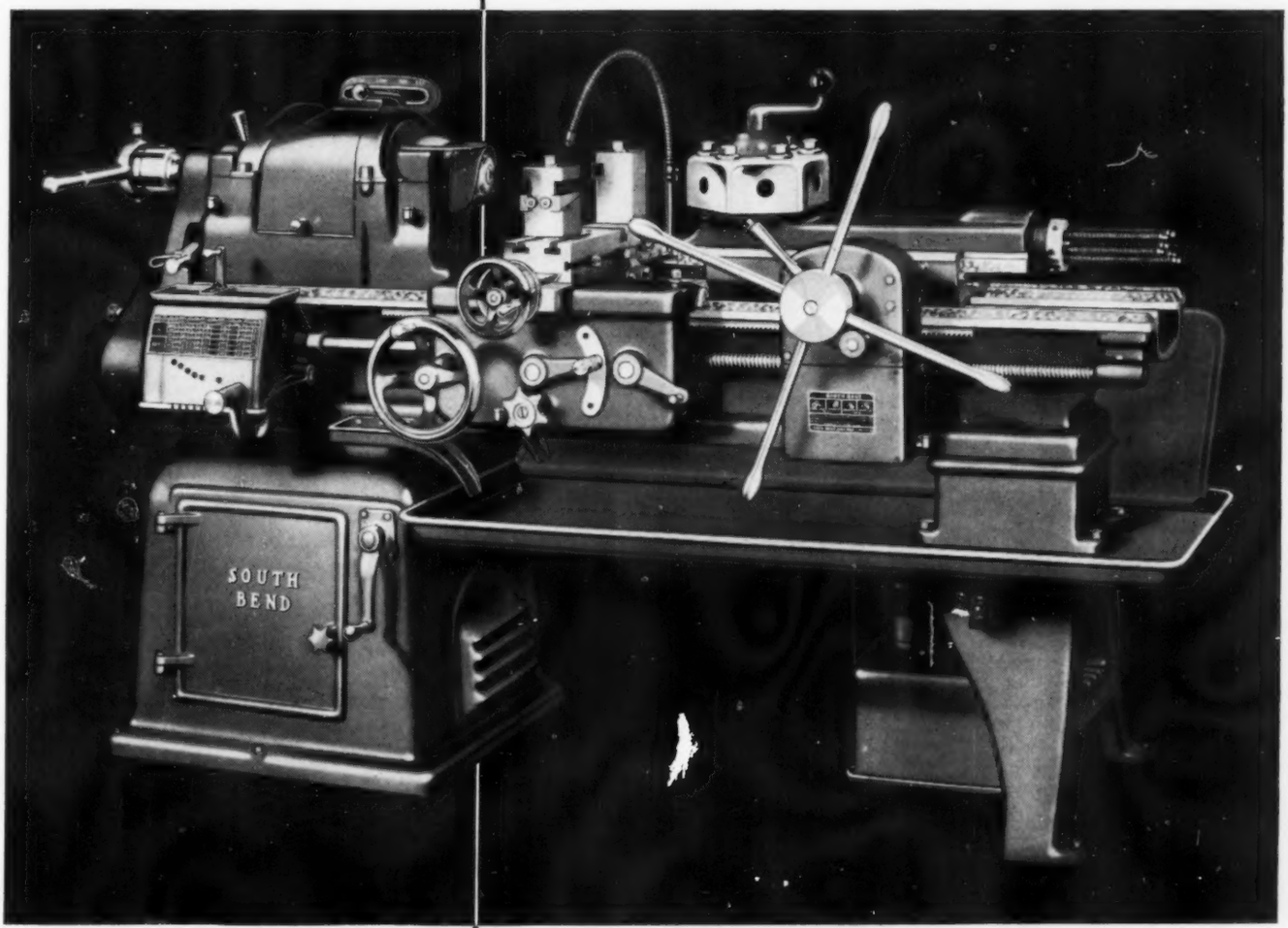

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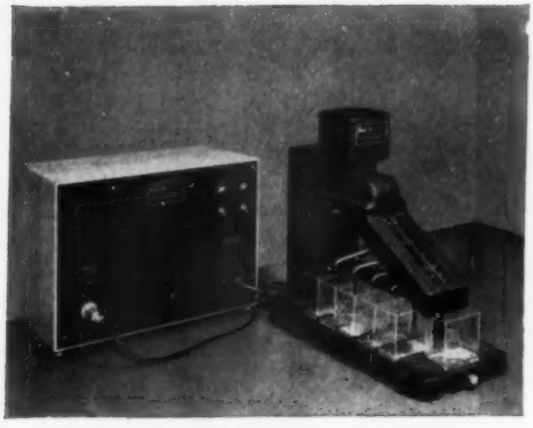

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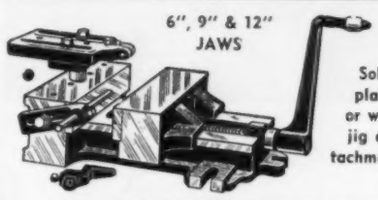

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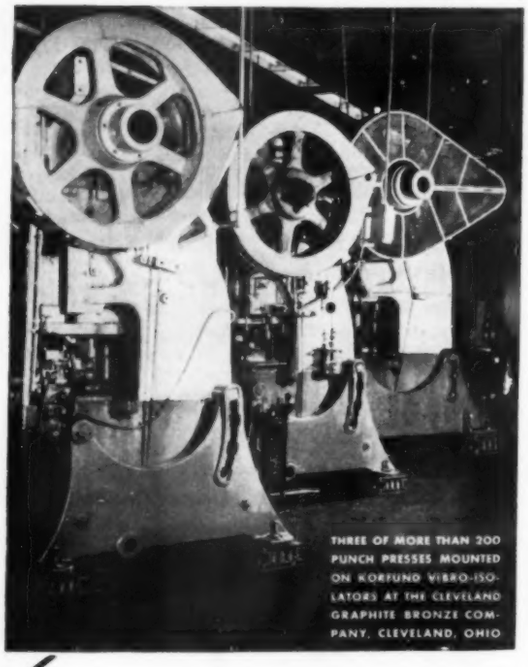

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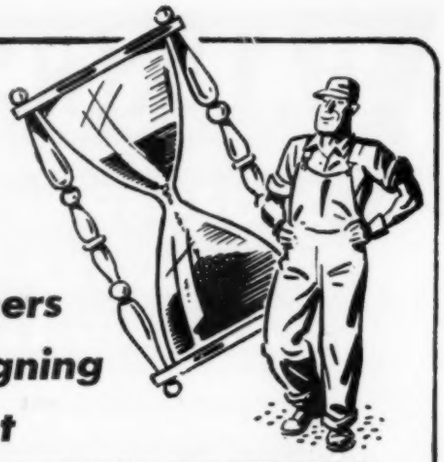

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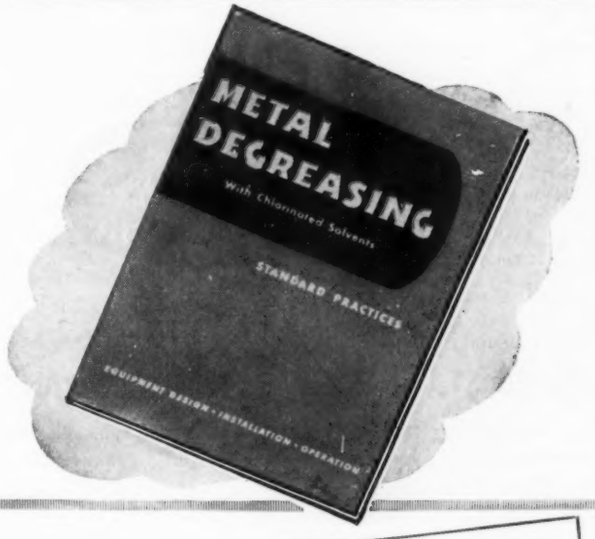

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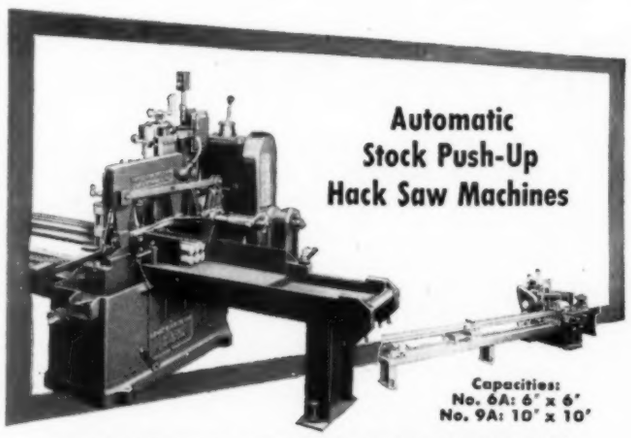

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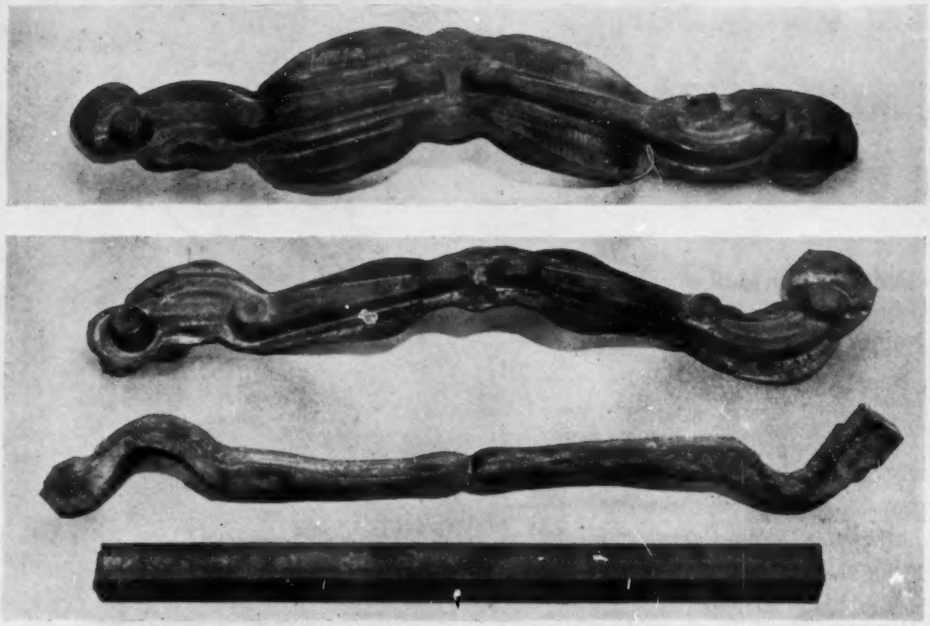

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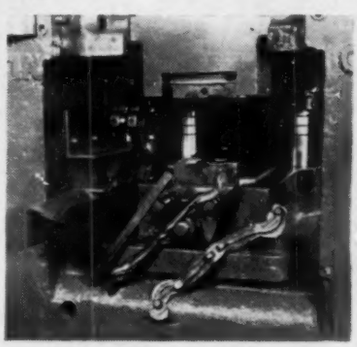
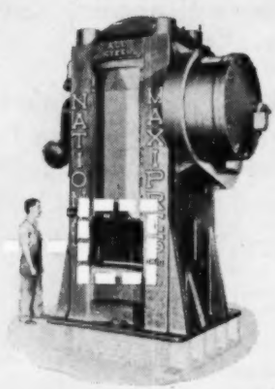
The Automobile Steering Arm—made two at a time—shown with the preformed blank and stock in the bottom illustration, was rolled and forged in a National No. 4 Maxipres equipped with the newly developed Maxiroll. The Maxiroll reduces the blank while the previous steering arm is being finish forged and the stock is so accurately distributed that only 5 pounds 6 ounces of material are required to give a sharp, well-filled forging.

The forging shown in the top illustration was forged in the conventional way. The stock required weighed 6 pounds 9 ounces.

You, too, may be able to reduce your forging costs with this new Maxiroll technique. May we help you investigate?





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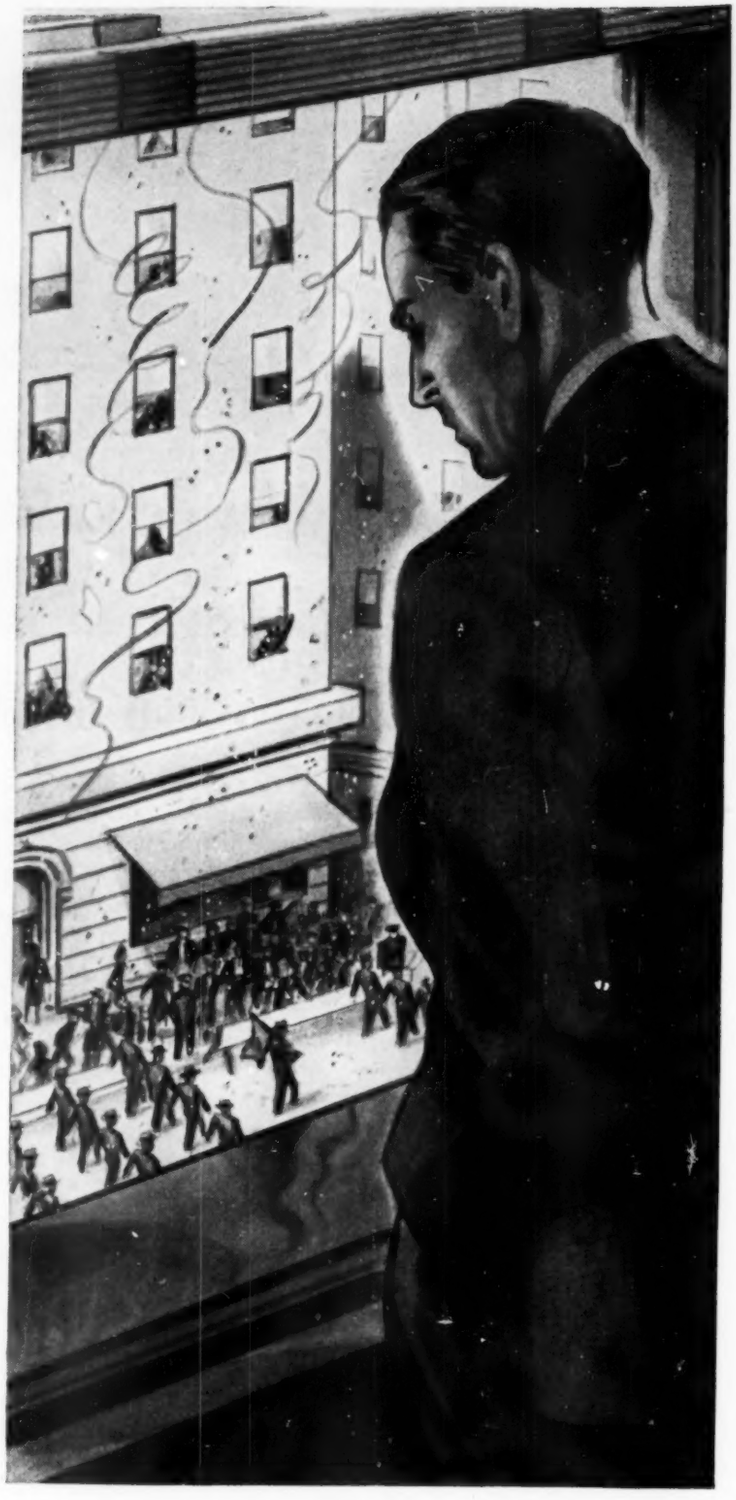
New York Detroit Chicago

MEMO TO PRESIDENTS WHO WATCHED THE BAND GO BY!



HERE'S ONE parade that isn't "all over but the shouting" after the band has passed. It's the Payroll Savings Plan for the regular purchase of U.S. Security Bonds by employees.

Though the formal spring campaign to sell Bonds is over, any company can still move forward with the parade. Right now thousands of companies are putting *additional push* behind their Payroll Savings Plans. Managements of many companies that have not yet participated are *now installing* the Plan.

It's a "look-ahead" plan, that benefits employee, company, and nation. Every $3 invested in Bonds pay $4 at maturity. Personnel records in the plants with active P.S.P. programs show improved employee attitudes—evidenced by less absenteeism and fewer accidents—as the individual's sense of security grows with Bond purchases. And every Security Bond dollar built up in the Treasury retires a dollar of the national debt that is potentially inflationary. It means less bidding-up of prices. Moreover, Bond buyers are better citizens because they have a tangible stake in the nation's future.

It's just as easy to take action now as when the campaign was at its height. Just call your Treasury Department's State Director, Savings Bonds Division, and ask for the material that helps to get a Payroll Plan started or to keep it rolling.

The Treasury Department acknowledges with appreciation the publication of this message by

American Machinist

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council.

CONTRACT WORK

PREMIER MILL CORP.
GENEVA, N. Y.

Facilities available for production manufacturing of small precision parts; building and assembling special machines, small tools, jigs, fixtures, etc. Experience in special alloys such as Stainless Steel, Hastelloy, Ni-Resist, etc. *Inquiries Welcomed.*

Equipment List Sent on Request

Very best facilities for
STAMPINGS
IN SMALL LOTS
DAYTON ROGERS
Manufacturing Company
Minneapolis [7], Minn.

KAMIS Engineering Company
Designers & Manufacturers of Tools & Machinery

Special machine work; facilities available for production quantities of small, medium and large machined parts, assemblies and fabrications. Specializing in stainless steel aviation gas turbine parts.

Send for Brochure No. 3 which describes our facilities in detail.

300 MCORE STREET
PHILADELPHIA 48, PA.

Put Your Idle Capacity to Work

Hundreds of metal-working companies are finding profitable business today outside their regular lines. Tell metal-working America—the 100,000 readers of **American Machinist**—about your facilities. Write for rates.

CONTRACT WORK DEPARTMENT
AMERICAN MACHINIST
330 W. 42nd St., N. Y. 18, N. Y.

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them
GENERAL PATTERN WORKS
2233 Burk Street Cincinnati, Ohio

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

DISPLAYED RATE

(Not available for equipment advertising)

90¢ per line, minimum 4 lines. To figure advance payment count 5 average words as a line.
POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.
PROPOSALS, 90 cents a line an insertion.

INFORMATION

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 1 line additional in undisplayed ads.
DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

The advertising rate is $9.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page. **A.M.**

NEW ADVERTISING received by 10 A. M. August 24th will appear in the issue of September 9th subject to limitation of space available

CHIEF ENGINEER

Manufacturer of drill heads, drilling machines and drill fixtures. Must take complete charge of engineering department of approximately 25 men. Located in Midwest. Salary open. Describe experience and background in first letter. All correspondence confidential.

P-6097, AMERICAN MACHINIST
520 N. MICHIGAN AVENUE **CHICAGO 11, ILL.**

PLANT MANAGER OR TOOLING DIRECTOR

Proven executive ability. Past record of good organization and Cost Reduction in all phases of manufacturing.

Wide background in Modern Tooling and Manufacturing Methods, including Tool and Product Design and Development.

Capable of improving going plant or of setting up complete new organization.

Thirty-eight years old. Married. West or Midwest. Present salary $9,000.00.

P.W.-6022, AMERICAN MACHINIST
520 W. Michigan Ave., Chicago 11, Ill.

SALES ENGINEER

Gear manufacturer wants representatives for following states. Must be familiar with mechanics of precision gears.

Give complete personal and background details, reference and experience in application.

NEW ENGLAND; NEW YORK STATE
PENNYLVANIA; MARYLAND: TEXAS
OHIO; ILLINOIS; MICHIGAN

S. W. 4544, American Machinist
330 W. 42nd St., New York 18, N. Y.

REPLIES (Box No.):
Address to office nearest you.
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

EMPLOYMENT SERVICES

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service 38 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 26¢ Dun Bldg., Buffalo 2, N. Y.

AUCTION ADVERTISING ON PAGES 222 & 234

POSITIONS WANTED

PLANT SUPERVISOR 50, complete supervision, 26 yrs. manufacturing light-heavy sheet metal products, tools, dies, machining, stamping, assembly, mass production, supervise research, cost conscious, labor relation, locate anywhere. Salary $7,200. PW-5264, American Machinist.

INDUSTRIAL SALES Representative experienced, successful sales engineer, executive background, Age 37, strong consumer and mill supply, hardware accounts. Now represent manufacturer of cutting and machinist tools, industrial specialties. Seek greater opportunity, eastern states or part thereof. Salary and commission basis. Will consider A1 company only. PW-6118, American Machinist.

ADDITIONAL EMPLOYMENT ADVERTISING ON PAGE 234

AR ACTION AUCTION
HERBERT I SEGAL, Auctioneer

BY ORDER OF **THE SYMINGTON-GOULD CORPORATION**

MORE THAN 4000 ITEMS
ORIGINAL COST OVER $5,000,000.00

WILL BE SOLD AT

ABSOLUTE AUCTION SALE

PIECE-BY-PIECE • ONE-BY-ONE • AND IN GROUPS

MACHINERY
FOUNDRY and PLANT EQUIPMENT
FURNITURE and FIXTURES

LARGE MACHINE SHOP and TOOL ROOM
POWER PLANT • ***FOUNDRY EQUIPMENT***
ELECTRIC MELT FURNACES • ***CUPOLAS*** • OVENS
ANNEALING FURNACES • LABORATORIES
"X" RAY EQUIPMENT • PATTERN SHOP
ELECTRICAL EQUIPMENT • 66 ELECTRIC CRANES
37 HOISTS • MONO RAILS • ***OFFICE FURNITURE***
OFFICE MACHINES • ***MAINTAINANCE EQUIP'T***
SHOP FURNITURE • ***ELEC. & GAS LIFT TRUCKS***
SHOP MULES • ***ELEC. MAGNETS***
AIR COMPRESSORS • ***DIESEL ENGINE*** • WELDERS
CONVEYORS • CRANE RUNWAYS • ***BELT FEEDS***
HYDRAULIC PRESSES • ***SAND MACHINERY***
DUST COLLECTORS • ***EXHAUSTERS*** • BLOWERS
WATER EQUIPMENT • INSPECTION MACHINES
COMPLETE KITCHEN
CAFETERIA & DINING ROOM EQUIP'T • ***TRUCKS***
TRAILERS • ***TRANSFER CARS*** • DUMP CARS
BUCKETS • LADLES • ***BINS*** • WASHING FOUNTAINS
LOCKERS • ELEC. CLOCKS
WOODWORKING MACHINERY
MOTOR GENERATOR SETS • ***TRANSFORMERS***
FREQUENCY CHANGERS

NOTE: AUCTION SALE, SEPT. 14, 15, 16, and 17th
INSPECT BEFORE THE AUCTION
WRITE FOR FREE BROCHURE OR CATALOG

• YOUR INSPECTION INVITED •

Inspection may be made from Tuesday, September 7th through Friday, September 10th from 10 A.M. to 4 P.M. or by special appointment. Facilities for inspection the weekend before the auction will be arranged on request.

AUCTION SALE
SEPTEMBER
14 • 15 • 16 • 17, 1948
At the Plant in ROCHESTER, N. Y.

FREE: Complete Numerical Catalog, listing and describing all items; together with Alphabetical Cross Index, complete Terms of Sale, etc. Address requests to Newark office.

ACTION! IN INDUSTRY
Asset Realization co.
790 Broad St., Newark 2, N. J.
14 Church St., New York 6, N. Y.

REAL ESTATE
MODERN INDUSTRIAL PLANT
will also be offered at AUCTION
as an entirety or in 7 parcels
• 430,000 sq. ft. mfg. space
• 45,000 sq. ft. new office building
• 40 acres of land
• R. R. Sidings: B. & O., Erie, N. Y. C. R. R. and P. R. R.
• Sprinklered
Write for FREE Brochure with maps, illustrations and Terms of Sale.

BUY FROM STOCK
Telephone
MAIN 6347-6348

FALK
MACHINERY COMPANY

18 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

ENGINE LATHES

36"x30' LeBlond, Geared Hd. Motor Dr.
32" x 28' Bridgeford, Geared Head, M. Dr.
32"x16' Bridgeford, Geared Head, M. Dr.
28"x10' Davis Quick Change Gear
26"x18' Bridgeford, Geared Head, M. Dr.
25"x14' LeBlond, Motorized
24"x18' American Q.C.G. Grd. Hd. 11' centers, Taper Attach. Motor Dr. Equipment
24"x14' Lodge & Shipley, Motorized
24"x16' American Motorized
24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
21"x18' Leblond, Motorized
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G. 72" centers
20"x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x10' American Geared Head
18"x10' Davis, Q.C.G. M. Dr.
18"x8' Davis Q.C.G. 42" centers, equipment
18 x8' Lodge & Shipley, geared head
18"x8' Hendey Q.C.G. 49" centers
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, MD.
16"x8' Hendey, Q.C.G. M. Dr.
16"x6' Lodge & Shipley Geared Head
14"x8' Rockford, Q.C.G. Collets
14"x6' LeBlond, Q.C.G. M. Drive
14"x6' Mulliner-Endlund, M. Drive
14"x6' Hendey, Q.C.G. M. Drive
14"x6' Rockford, Q.C.G. M. Drive
13"x5' South Bend Q.C.G. 30" centers
12"x30" American, Wood Spinning
12"x5' Sidney, Geared Head
12"x5' Hendey, Q.C.G. M. Drive
12"x5' Sebastian Q.C.G. Grd. Hd.
12"x3' Craftsman, Bench, M. Drive
12"x18" Porter-Cable Carbo-Lathe
11"x4' Sidney, Q.C.G. Floor Type

TURRET LATHES

Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
Oster #601 Hand Screw Machine 1½" cap.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed, 1½"
W-Swasey #3 Univ. 1½" cap., M. Dr.
Gisholt #4 Univ. 2" cap., M. Dr.
W-Swasey #2A Univ. 2½ ' Cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 3½" cap., M. Dr.

KUX DIE CASTING MACHINES Model #BH-30 Hydraulically Operated, One Cycle Automatic Control. Equipped with (24) Cavity Die. Motor drive, 7½ h.p. 3/60/220/440 volts.

BENDING ROLLS

San Angelo, initial type 6' x 16 ga.
Niagara, initial type 12' x ⅛"
Hendley-Whitmore 6' x 3/16"
Dekom Angle Bending, 3 x 3 x ⅜, M. Dr.

METAL ROUTERS

Onsrud Double Spindle Radial Arm #A2DD, 108" Arms with frequency Converter for 3/60/220 volts service.
Onsrud Model #W-255 Single Spindle Router. Swivel head with front & rear travel, table has vertical travel.

LAPPING MACHINES

Norton #2F Hand Lapping Machines. 36" diameter table. Motor drive with 3/60/220/440 volts motors. Late Type Machines, excellent condition. IMMEDIATE DELIVERY.

New & Used Motors
All Sizes IN STOCK

GRINDING MACHINES

J & L #TG-615 Automatic Thread, M. Dr.
Norton 6x18 Vert. Surface, Excello Spindle
Norton 6x18 Horiz. Surface, Excello Spindle
Brown & Sharpe #2 Auto. Surface, 6x18
Pratt & Whitney 14x36 Vertical Surface
Blanchard #16, 30" Vertical Surface
Thompson Hydraulic Horiz. Surface
Abrasive Automatic Surface, 22x8
Reid #2 Automatic Surface, 6x18
Norton Hydraulic Horiz. 6x36
Heald #25 Rotary Surface
Seybold 96" Knife, belt driven
Brown & Sharpe #2 Face, motorized
Rivet #3 Internal, Cone driven
Heald #70 Internal, Belt drive
Heald #60 Internal, Belt drive
Norton #2 Univ. Tool & Cutter, Belt Dr.
Cincinnati #1½ Univ. Tool & Cutter, Belt Dr.
Oakley #3 Tool & Cutter, Belt Dr.
G & Livingston #4 Tool & Cutter
Cincinnati #2 Tool & Cutter, M. Dr.
Cincinnati "Monoset" Tool & Cutter
Cincinnati #2 Centerless, M. Dr.
Gorton Dble. End Disc, 18" dia. discs
Besley Dbl. End Disc, 30" dia. discs
Greenfield #12 Internal Hydraulic
Cincinnati #2 Univ. Cylindrical 6x36
Brown & Sharpe #10 Cylindrical 6x18
Brown & Sharpe #11 Cylindrical 10x30
Brown & Sharpe #4 Univ. Cylindrical 12x60
Brown & Sharpe #5 Plain Cylindrical

AUTOMATICS

No. 0 & No. 00 Brown & Sharpe
No. 0 Brown & Sharpe Automatic Cutoff Machine
#2 Brown & Sharpe High Speed Automatic. Turner Drive.
1—1¼" Cone 4-spindle Automatic M.D. Threading Spindle
Cleveland Model "A" 3¾" Single Spindle. Motor driven.

PUNCH PRESSES

Caldwell 200 tons Horiz. Hydr. Wheel Press.
Ferracute No. EG52 Coining Press. 150 tons. Up moving ram. 2¼" Stroke
General Flexible Power Press. 8 tons, M. Dr.
Stiles O.B.I. 14 tons, 1½" stroke.
Michigan O.B.I. 36 tons cap. 2" stroke. Wide Ram, wide Bed. Motor driven
Bliss No. 68C Dbl. Action, Gap Frame.
Lucas 15 tons, Power Arbor Press. M. Dr.
Hub O.B.I. 15 tons, 2" stroke, M. Dr.
Tompkins & Johnson Power Arbor Press. 3½" Stroke. Cap. 6500#
McCall No. 4 O.B.I. 2½" stroke, 25 tons.
NEW Johnson O.B.I. Presses. All sizes.
Bliss #305 Geared S.S. Single Action
Bliss #109 Slitter, lo ga. cap.
Nilson 56 tons S.S. Dbl. Crank 3-Die Transfer Press
Bliss #18, #20 O.B.I. Motorized

SHEARS

Hilles & Jones #4 Single End
Bliss #109 Slitter, lo ga. cap.
Pexto #571 Slitter, 3/16" cap.
Wais & Roos 10' x ¼", 15' gap
Ohl 6'x14 ga. Cap. Squaring
NEW Famco 36"x18 ga. Squaring
Thomas #7, 8'x¼" Squaring

Sutton #2 Straightening Machine. Cap. ¾" to 3½" tubes or solids. 50 h.p. 3/60/220 volts motor drive.

BROACH

Oilgear, Horizontal Hydraulic Type #XA. Capacity —20,000#, 56" stroke. Motor driven. Coolant system and hydraulic system.

MILLING MACHINES

Vernon #0 Hand, Late Type, M.D.
Nichols Hand, Late Type, M.D.
Sundstrand #0 Rigidmil, M.D.
Whitney #6 Hand, Cone Drive
Hardinge B.B. Vertical, Bench
Bickett #1 B.B. Vertical, Bench
Ames Universal Horiz. Bench
Becker #5C Vertical, Cone Dr.
Knight #1½C Vertical
Cincinnati #3 & #4 Vertical
Cincinnati #2 Univ. Horizontal
Cincinnati #3S Univ., Horizontal
Cincinnati #3, #4, #5 Pl. Horiz.
Cincinnati #2M Univ. Horiz.
Brown & Sharpe #0, 1, 1Y Horizontal
Brown & Sharpe #2 Univ. Horiz.
Brown & Sharpe #1D Univ. Horiz.
Brown & Sharpe #3 Univ. Horiz.
Kempsmith #1, #2 Plain Horiz.
Cincinnati 18" Mfg. Plain
Garvin #14 Plain Horizontal
Milwaukee #2K Vertical, M. Dr.
Milwaukee #3K Verical, M. Dr.
Milwaukee #1½ Dbl. Overarm, Horiz.
Milwaukee #2B Dble. Overarm, Horiz.
Milwaukee #2B Universal Horiz.
Milwaukee #3B Plain Horizontal
Brown & Sharpe #12 Production, M. Dr.
Pratt & Whitney #2 Duplex, Motorized
Van Norman #2 Duplex, Motorized
Cincinnati #0-8 Vertical, M. Dr.
Cincinnati #0-8 Plain Automatic
Cincinnati #0-8 Rise & Fall
Cincinnati #2-18 Plain Automatic

Heald No. 49 Single End. Two Head Borematic. Arranged direct current motor drive. Series 200 Spindle Heads. Universal Fixture on hand feed cross slide.

SHAPERS & PLANERS

Shaper—Pratt & Whitney Vertical 6" with Rotary table & motor drive.
Shaper—Logan 7" Horizontal. NEW
Shaper—Machinery Sales 16", motorized
Shaper—Gould & Eberhardt 16", motorized
Shaper—Smith & Mills 16", motorized
Shaper—Potter & Johnston 16", Universal
Shaper—American 24" crank, motorized
New Haven 12" Slotter, motorized
Planer—Whitcombe 24x24x6 motorized
Planer—Shaper—Niles-B. Pond 20x20x24
Planer—Betts 60x60x30 Modern 4-Head
Planer—Betts 72x60x30 Modern 4-Head
Planer—Betts 72x60x25 Modern 4-Head
Planer—Betts 122x72x34 Modern 4-Head

Above Planers motor driven.

DRILLING MACHINES

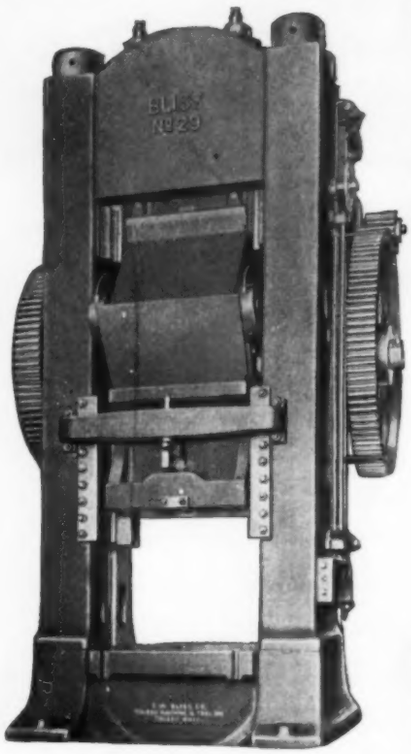
American 8' Triple Purpose Radial, M.Dr.
Cinci-Bickford 6' Arm, 15" col. Radial
Cinci-Bickford 5' Arm, 13" col. Radial
Demco 4-Spindle Drill #2 M.T. M. Dr.
Pratt & Whitney 2-Spdle. Profiler
Natco #12, 20 Spdle Multiple, 3/16" cap.
Fox #15, 54 Spdle. Multiple, #1 M.T.
Minster #2D Single Spindle Upright Heavy Duty. 2½" cap. Compound Table. Motorized
Canedy-Otto 21" Single Spdle. Late Type
Cinci-Bickford 21" Drilling & Tapping, #3 m.t.
Buffalo Forge #2MS Drill. Late Type
Barnes 22" Backgeared Upright Single Spdle.
Leland-Gifford #2MS, 2-Spindle Upright
Edlund #2B, 4-Spindle Upright, #2 m.t.
NEW Buffalo Forge #15, #18 Single Spdles.

CHIP SEPARATORS

Barrett #501D Centrifugal, Ball-bearing. 3/60/220 volts motor.
Fletches, 14" Bowel, ball-bearing, motor driven, 3/60/220/440 volts.

KNUCKLE JOINTED COINING PRESSES

TOLEDO - - - 667 - - - 668



Pneumatic Operated Friction Clutch

CAPACITY . . .	1200 TONS	. . .	1500 TONS
STROKE	5 "	. . .	6 "
DIE SPACE . . .	33½ "	. . .	36½ "

DOUBLE BACK GEARED

Equipped with Two Station Air Operated Dial Feed — Bottom Lift Out — And Air Operated Pickoff

IMMEDIATE DELIVERY

•

Age:—Practically New!!

•

EMERMAN MACHINERY CORP.

875 W. 120TH STREET CHICAGO 43, ILLINOIS

NEW SURPLUS

HIGH SPEED TOOL BITS

3/16"	square x 2" long	$.05 each
¼"	square x 2½" long	.10 each
5/16"	square x 2½" long	.15 each
⅜"	square x 3" long	.20 each
7/16"	square x 3½" long	.35 each
½"	square x 4" long	.50 each
⅝"	square x 4½" long	.75 each
¾"	square x 5" long	1.00 each
⅞"	square x 6" long	1.25 each
1"	square x 7" long	1.50 each

VICTOR MACHINERY EXCHANGE, Inc.

251 CENTRE STREET
NEW YORK 13, N. Y.
CANAL 6-5575

USED MACHINERY BARGAINS AT REYNOLDS OF PROVIDENCE

5 #3 Bardons & Oliver Universal Turret Lathes. Bar feed, late type.

1 #5 Bardons & Oliver.

1 #4 Warner & Swasey Universal—Serial #351589.

1 #3 Cincinnati Dial Type Vertical Milling Machine. Spindle speeds 18-450 R.P.M. Very good.

REYNOLDS MACHINERY COMPANY

305 EDDY STREET
PROVIDENCE 3, R. I.
Telephone Jackson 8900

UNUSUAL VALUES

Milling Machines—No. 1, Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylinder B & S No. 11, Planer type 16"x36", Surface 13"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10'—16"x6', 8', 10'—18"x6', 8', 10'—26"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 19" and 18" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—3'x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 36", 46".

SPECIAL—New totally enclosed dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¾" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Hi Duty 3" capacity in steel, motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.

P. O. Box 88, Columbus 16, Ohio

THE LARGEST MACHINE TOOL PLANT IN THE U.S.A.

Eastern OFFERS FROM STOCK

DEVOTED EXCLUSIVELY TO REBUILT MACHINERY

TURRET LATHES AND SCREW MACHINES

No. 1H6 Libby, m.d., chucking, latest
No. 1 Cincinnati Acme Semi-Universal, m.d., bar
No. 1 Cincinnati-Acme, chucking
No. 1L, 2L, 3L Gisholt, m.d., chucking, standard and long bed types
No. 1A, 2A, 3A Warner & Swasey Universal, m.d., bar
No. 1A, 2A, 3A Warner & Swasey Universal, m.d., chucking
No. 1A Warner & Swasey Universal, m.d., chucking, pre-selector head, latest
No. 2 Cincinnati Acme Full Universal, m.d., chucking, latest
No. 2B Foster Universal, chucking
No. 2G Morey Ram Type, bar
No. 2 Warner & Swasey All Geared Head Ram Type, m.d., bar
No. 2A Warner & Swasey Universal, m.d., chucking, Timken
No. 3 Cincinnati Acme Full Universal, m.d., chucking
No. 3, 5 Foster All Geared Head, m.d.
No. 3B Foster Unversal, m.d., bar
No. 3L Gisholt, m.d., with cross-sliding turret, chucking
No. 3, 4 Warner & Swasey, m.d., pre-selector head, bar and chucking types, Timken, latest type
No. 3A Warner & Swasey Universal, m.d., chucking, latest
No. 4-R Cincinnati Acme, m.d., bar
No. 4 Gisholt Universal, m.d., chucking, Timken
No. 4 Warner & Swasey Plain, cone, motorized
No. 4 Warner & Swasey Universal, geared head
No. 4A Warner & Swasey Universal, m.d., chucking, 8" hole, Timken, latest
No. 4A Warner & Swasey, m.d., chucking, 7½" hole, Timken
No. 5 Bardons & Oliver Universal Ram Type, m.d.,
No. 5 Foster All Geared Head Universal, m.d., chucking
No. 7 Bardons & Oliver Universal Ram Type, m.d., chucking
No. 7 Bardons & Oliver, cone
2½x24", 3x36", 3½x32", 4x34" Jones & Lamson Geared Head Turret, m.d., bar and chucking types
2½" Jones & Lamson Universal Saddle Type, m.d., bar, late
3¼" Cincinnati Acme Geared Head Flat Turret, m.d., chucking
18" Libby Type A, m.d.
20" Acme, cone
24", 28" Gisholt, cone
26" Libby Type C Turret, m.d., chucking
No. 5 Woods Tilted Turret, Model D, cone

SHAPERS

24" Gould & Eberhardt Invincible, m.d.
24" Gould & Eberhardt High Duty, m.d.
24" Potter & Johnston, cone

AUTOMATICS

4 spindle 1¼" Cone, m.d., latest
No. 4D Potter & Johnston, m.d., latest
No. 5D—12"—2 spindle Potter & Johnston, m.d., latest
No. 5D-2—15" Potter & Johnston, m.d., latest
No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.
14" Fay, m.d.
20x25" Jones & Lamson, m.d., latest
4 spindle ⅞" Cleveland Model M, m.d., bar
4 spindle ⅞" Model R-4 Acme-Gridley, m.d., bar
4 spindle 2" Cleveland Model M, m.d., bar
4 spindle 2¼" Cleveland Model K, m.d., bar
2¼" Gridley, m.d.
2½", 4¼", 4½", 5½", 6", 7¾" Cleveland Model A, m.d.

BOLT THREADING MACHINES

¾" Economy Style R Automatic, belt
3 spindle 1¼" Acme, cone

HORIZONTAL BORING MILLS

No. 42 Lucas, 4" bar, m.d., 1941 machine
No. 25T Giddings & Lewis, 2½" bar, m.d., latest
Morris Mor-Speed Drilling & Tapping, m.d.
2½" bar Cleveland, m.d.
No. 31 Lucas, m.d. 3" bar
No. 33 Lucas, m.d., 4½" bar
No. 45 Giddings & Lewis, m.d., 5" bar
4" bar Detrick & Harvey Floor Type, m.d.
4" bar Landis Floor Type, m.d.
5½" bar Niles, m.d.
10" bar Sellers, m.d., floor type

VERTICAL BORING MILLS

24", 36", 42" Bullard New Era, m.d., with side head
36", 42" Bullard Spiral Drive, m.d., with side head
42" Colburn H.D., m.d., 2 rail heads
48" Cincinnati, m.d., 1 swivel, 1 turret head
48" Colburn, m.d., 1 swivel, 1 turret head
48" Putnam H.D., 2 swivel heads, m.d.
52" King, m.d., 2 swivel heads
54" Colburn, m.d., 1 turret, 1 swivel head
84" Niles H.D., 2 swivel heads, p.r.t.
100" Niles Heavy Pattern, m.d., 2 swivel heads, p.r.t.
100" Niles Extra Heavy Pattern, m.d., p.r.t., 2 swivel heads, late type
120" Niles Heavy, m.d., p.r.t., 2 swivel heads

BROACHING MACHINES

Cincinnati Milling Mach. Co. Mill Broach, m.d., 10" spindle
No. 4 LaPointe of Hudson, gear box
No. 4 Oil Gear Hydraulic type XA, 64" stroke, m.d.
No. 75 H.P. LaPointe Hydraulic, 37½ tons, 150" stroke

BALL BEARING DRILLS

Walker-Turner Bench Type, m.d.
No. ½ Avey, m.d.
No. 1B Edlund, m.d., new
No. 5M, 16" Fosdick, m.d.
2 spindle No. 3 Avey, m.d., tapping
2 spindle 21" Canedy-Otto, m.d.
2 spindle No. 3 Edlund, m.d.
3 spindle No. ½ Avey, m.d., latest
3 spindle No. 2 MA6 Avey, latest
4 spindle No. 2 Avey MA6, latest
6 spindle No. 2B Edlund, m.d.
6 spindle Henry & Wright Class B, m.d.
6 spindle Leland & Gifford, m.d.

HORIZONTAL DRILLS

No. ½Bx50" Pratt & Whitney 2 spindle Gun Drill, m.d., latest
No. 1Bx50" Pratt & Whitney 2 spindle Gun Drill, m.d., latest
No. 1Bx50" Pratt & Whitney Horizontal Reaming Machine, m.d., latest
No. 1 Pratt & Whitney 2 spindle Gun Drill, m.d.
No. 1½x105" Pratt & Whitney 2 spindle Drill, m.d., latest
Pratt & Whitney Rifling Machine, belt
Barnes 2 spindle Deep Hole Drill, m.d., late
5 spindle Detroit Semi-Automatic Drill, belt

MULTIPLE SPINDLE DRILLS

No. 3 Baush, m.d., 16x30" head, 12 spindles
No. 3 Baush , m.d., 20x40" head, 15 spindles
P7 Baush Hydraulic, 20x30" head, 12 spindles, m.d.
D13H Natco, m.d., 18x12" head, 10 spindles
No. 16 Fixed Center Foote-Burt, m.d., 8 spindles
3 spindle 24" Barnes All Geared Self-Oiling, m.d.
3 spindle 12" Rockford Gang, m.d.
4 spindle Foote-Burt Rail, m.d.

RADIAL DRILLS

3' American Sensitive, belt
4' American Sensitive, m.d. on arm
4'-12" Fosdick, gear box on base
4'-13" American Triple Purpose, gear box on base
4' Niles-Bement-Pond Semi-Universal, m.d.
5'-13" American Triple Geared, m.d.
5'-15" American Triple Purpose, gear box on base
5' Cincinnati-Bickford Full Universal, gear box
5' Cincinnati-Bickford Plate Hole Driller, m.d. on arm
5'-13" Cincinnati-Bickford, gear box
5'-13" Cincinnati-Bickford, d.c. motor
5' Prentice, m.d.
6'-15" Carlton, gear box
6'-15" Cincinnati-Bickford, m.d.
6'-15" Niles-Bement-Pond Semi-Universal, m.d.
6'-16" Western, m.d.
7'-17" Dreses, gear box
8'x19" American Triple Purpose, m.d. on arm, p.r.t., late type
8'-16" American Triple Purpose, m.d. on arm
10'-22" American Triple Purpose, m.d. on arm, p.r.t.

UPRIGHT DRILLS

20" Barnes All Geared Self-Oiling, m.d.
21" Cincinnati-Bickford, m.d.
24" Cincinnati-Bickford, belt
25" Cleereman, m.d., latest type
30" Rich, H.D.
H3 Barnes Hydram, m.d.
D4 Colburn H.D., m.d.
D8 Colburn H.D., m.d.
No. 25 Foote-Burt, m.d.
No. 360HO Baker H.D., m.d., with 40" Circular table
No. 217 Baker H.D., s.p.d.

GEAR SHAPERS

No. 6, 61, 645 Fellows, belt
No. 7, 7A Fellows High Speed, m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 61A, 65A3, 615A, 645A3 Fellows, m.d., latest type, pract. new
No. 64-S Fellows, m.d.

GEAR GRINDERS

No. 13LS Fellows Gear Lapper, m.d.
9" Pratt & Whitney Hydraulic Spur Gear Grinder, m.d.
10" Pratt & Whitney Spur & Helical, m.d.
No. 2HS Lees-Bradner Spur & Helical, m.d., 12" cap.

GEAR HOBBERS

Model T Barber-Colman, m.d., latest
No. 12H Gould & Eberhardt Universal, m.d., p.r.t.
No. 34 Brown & Sharpe, m.d., for spur gears
No. 36H Gould & Eberhardt, m.d., with automatic infeed attachment for worm gears
No. 44 Brown & Sharpe, m.d., for spur and spiral
48" Cleveland, m.d.

GEAR CUTTERS

3" Gleason Straight Bevel, m.d.
No. 3—26" Brown & Sharpe Spur, m.d.
No. 4—48" Brown & Sharpe Spur, m.d.
No. 6—72" Brown & Sharpe Spur, m.d.
8" Gleason Mfg. Type Straight Bevel, m.d.
11" Gleason Straight Bevel, m.d.
12" Gleason Straight Bevel, m.d.
Gleason Spiral Bevel Gear Rougher, s.p.d.
Cincinnati Gear Burnisher, m.d.
No. 1 Brown & Sharpe Spur Gear Tester
Cross Gear Tooth Rounder, m.d., 9" cap.
National Broach & Machine Red Wing Gear Speeder, m.d., 10" cap.
Gleason Gear Tester for gears ground on No. 7 Gleason Hypoid Grinder

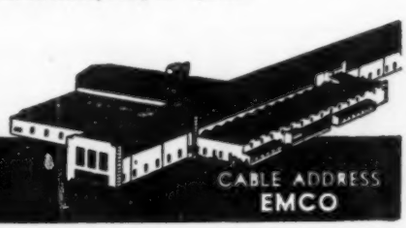
CENTERLESS GRINDERS

No. 2 Cincinnati, m.d., Filmatic Spindle, latest
No. 2 Cincinnati, m.d., older types
Cincinnati Valve Seat Grinder, cap. ⅜" valve stems
Long bar attachment for No. 3 cap. ¼"x18' long

CYLINDER GRINDERS

No. 50 Heald Hydraulic, m.d., 15" spindle, new
No. 50 Heald Hydraulic, m.d., 11-18" spindle
No. 73 Heald Airplane Cylinder, m.d., brand new, 1944 machines
No. 55 Heald, m.d., 15" spindle

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times.



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(2) NO. 74 HEALD INTERNAL GRINDERS. Serial Nos. 24602 and 24603. Excellent Condition. PRICE.....$2,250.00 ea.

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(4) DETROIT GEAR GRINDERS, Model GG-19. PRICE...$1,150.00 ea.

(1) TURCHAN FOLLOWER FOR BULARD BORING MILL. PRICE.....$1,000.00

(1) 24" STEPTOE SHAPER, With Universal Vise. New in 1942, Serial No. EB41385TB. PRICE.....$3,500.00

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HEADLINERS

LATHES

12"x5' SEBASTIAN Model R Grd Hd., new 1947
14"x6' AMERICAN 12-speed Grd Hd, AC MIB, taper
16"x16' LODGE & SHIPLEY 3 SCD DBG, 12'5" centers, Q.C.
18"x10' MONARCH 3 SCD DBG bowl hd
20"x8' LODGE & SHIPLEY Selec Grd Hd, AC MIB, taper
20"x10' LODGE & SHIPLEY Selec Grd Hd, AC MD
22"x10' ROCKFORD 3 SCD DBG bowl hd
24"x14' BOYE & EMMES, Turner Drive
24"x14' MONARCH 3 SCD DBG, taper
24"x14' LODGE & SHIPLEY, Turner Drive, taper
30"x16' LODGE & SHIPLEY, Lima Drive, taper

MILLERS

#2 CINCINNATI H.P. Rect. O/A Plain, AC MIB, PRT, Timken
#2B MILWAUKEE Plain, AC MD, DOA
#2B MILWAUKEE Univ., AC MD, DOA
#2M CINCINNATI Plain, AC MIB, Timken, #50 spindle
#3 KEMPSMITH Univ., div hd, vert hd
#4 CINCINNATI H.P. Univ., Lima Drive, div hd, vert hd, slot attach
#4B MILWAUKEE Plain, AC MD, PRT, DOA
#4B BROWN & SHARPE Plain, AC MIB, DOA, #50 spindle
#4 CINCINNATI H.P. Vert., AC MD, PRT, intermittent feeds
6"x84" PRATT & WHITNEY Thread
#4—48" CINCINNATI Rise & Fall Hydromatic

SHAPERS & PLANERS

14", 16", 20" GOULD & EBERHARDT High Duty
24" CINCINNATI 4 SCD BG
24" MILWAUKEE, Lima Drive
28" AMERICAN H.D., AC MD
30"x30"x8' CINCINNATI, AC MD
36"x36"x16' GRAY, AC MD, 4 hds
48"x48"x18' PUTNAM Hvy Duty, AC MD, 4 hds

DRILLS

#1 AVEY 4-spdle, 7½" OH, AC MD
#2 COLBURN Mfg.
#3 AVEY, AC MD, 12" OH
21" & 24" CINCINNATI-BICKFORD slid hd

RADIAL DRILLS

2' & 3' AMERICAN Trip Grd, S.P.D.
3' CINCINNATI-BICKFORD, AC MD thru gearbox
4' MORRIS, MD
6' CINCINNATI-BICKFORD mtr on arm
7' DRESES, 17" col., AC MD thru gearbox

GRINDERS

#16—26" & #16—30" BLANCHARD Vert Spdle Surf, AC MD
8"x18" CINCINNATI Saddle Type Cyl., AC MD
#2 BROWN & SHARPE Universal, AC MD
#24—53" GARDNER Tub Type Vert Spdle Disc, AC MD
#3 CINCINNATI Centerless, new 1943

BORING MILLS

#3A UNIVERSAL Horz. 3" bar, SPD
#43 LUCAS Horz., AC MD, 4½" bar, 20' betw faceplate & outer support
36" BULLARD "New Era" Vert. Turret Lathe, AC MD

GEAR MACHINERY

#1 ADAMS Hobber, AC MD
#3 ADAMS Hobber, belt
#18H GOULD & EBERHARDT Hobber, AC MD
#34 BROWN & SHARPE Hobber, AC MD
#61 FELLOWS Shapers
#6—60" BROWN & SHARPE Cutter

TURRET LATHES

#2B FOSTER Univ. Grd Hd, SPD
#3A WARNER & SWASEY Univ., long bed, AC MD
#4-W CINCINNATI ACME Univ., AC MD, thread chasing

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BARGAINS!

SURPLUS EQUIPMENT

BRIDGEFORD 36x24' Centers Engine Lathe, Motor Drive
BULLARD 16" 6 and 8 spindle Mult-au-matic Type D Single Indexing, New 1943
CINCINNATI 120x96x26' Table Housing Planer, 4 heads, Power Rapid Traverse, Box Table, DC Reversing Motor Drive
CINCINNATI #3, #4 Vertical Milling Machine, Geared Motor Drive
CRANES from 5 to 30 ton capacity all 230 volts, DC current
FRANKLIN 4¼" Bar Horizontal Boring Mill Table Type Motor Drive
HEALD #48A Boremastic Double Spindle Single End New 1941.
JONES & LAMSON "Fay" 20x25 Centers Production Lathe, New 1941
LoSWING 8x108" Centers Production Lathe, New 1941
NILES 30x50' Bed Boring Lathe, New 1941
NILES 72x63' Centers, Combination Boring and Turning Lathe, Motor Drive

NIAGARA 1200 KVA Outdoor Type Transformer, Oil cooled, 2400-240 volts, 3 phase, 60 cycles, Latest Type

This is a partial listing. More than 1,000 other items for immediate delivery. Our prices cannot be duplicated. We Solicit your inquiries.

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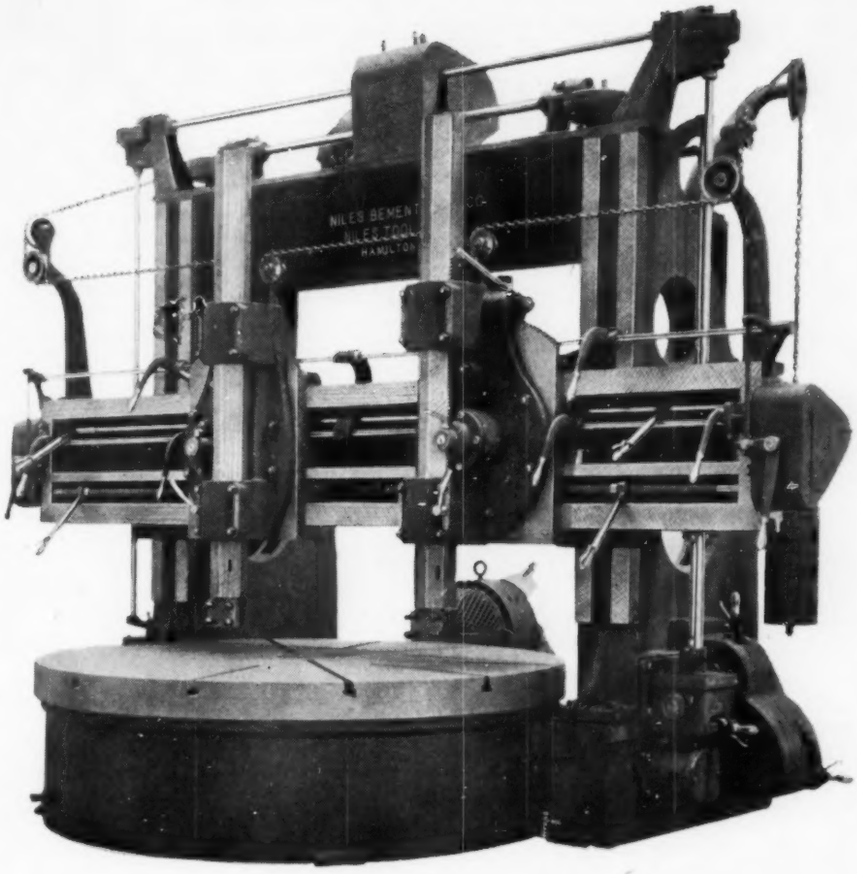
LATEST TYPE NEARLY NEW MACHINES



NILES BEMENT POND 84" and 100" Vertical Boring and Turning Mill, 2 Swivel Heads on Cross Rail, Power Rapid Traverse, AC/DC Motor Drive

CINCINNATI ‡2 Centerless Grinder "Filmatic", Latest Type

CINCINNATI No. 3 Univ. Milling Machine—Dial Type, Timken, Latest Type

CLEARING Type DS-1125-32 Double Action Eccentric Press, 125 Ton Capacity, Tie Rod, Latest Type

DETRICK & HARVEY 48x48x16' "HYDRAULIC" Planer, 4 Heads, Motor Drive

FELLOWS ‡61, 615A, 7, 7A, 72, 77 High Speed Gear Shaper, Latest Type

GISHOLT ‡3, ‡4 Universal Turret Lathe, Latest Type

GLEASON ‡17 Hypoid Spiral Bevel and Zerol Gear Grinder, Latest Type

GLEASON ‡7 Hypoid Spiral Bevel and Zerol Gear Generator, Latest Type

GOULD & EBERHARDT ‡96H Gear Hobber with Differential, Motor Drive

GOULD & EBERHARDT No. 96H Gear Hobber—with Differential, Infeed, Motor Drive

HEALD No. 25A Rotary Surface Grinder—16" and 30" chuck, Hyd., Latest Type

HEALD 25A Rotary Surface Grinder, 16" & 30" Chuck, Motor Drive

HEALD 70A, 72A3, 72A5, 81 Internal Grinder—Plain and Sizematic, Latest Type

JONES & LAMSON ‡3, ‡5, ‡8A Universal Turret Lathe, Latest Type

KEARNEY & TRECKER No. 2H, 2K Vertical Miller, Timken, Latest

KING 62" Vertical Boring Mill, 2 Swivel Heads, Motor Drive

LUCAS ‡41 3" Bar Horizontal Boring Mill, Latest Type

MATTISON 14x24x72 Hydraulic Surface Grinder, Latest Type

MONARCH 12x54" Centers Toolroom Lathe, Latest Type

NILES 60"x10' centers Heavy Duty Engine Lathe, Latest Type

PRATT & WHITNEY 3B Model 4854 Jig Borer, Latest Type

REED PRENTICE ‡5 Vertical Miller and Die Sinker, Latest Type

UNIVERSAL 3" Bar Horizontal Boring Mill, Latest Type

WARNER & SWASEY ‡2A Universal Turret Lathe, Latest Type

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200,000 lbs.	Welding Electrodes, various
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273	Industrial Trailers, 4000 lb. cap.
83	Swaging Machines, American Phenolic Corp. Model B
47	Motors, Wagner Elec. Corp., ¼ and 1/20 H.P.
45	Battery Charging Stations, 5 KW, Gas-Engine driven
21	Controllers, Westinghouse, 5 H.P., 115 V. D.C.
14	Panels, various
12	Wood Hospital Beds
12	Turbine Rotors, various
10	Winches for mine sweeping, 2-drum, single gypsy, reversible
6	Air Compressors, Westinghouse, Types 3-GW and 3-GW-38, cap. 250 lbs. per sq. in.
6	Oil Baths, Electric 78x31x46"
4	Connecting Rod Borers, C. Allen Fulmer Co., Model B
2	Motor Generators, with spare parts, 38 and 10 H.P.
1	Wood-working Drill Press, Delta Mfg. Co., drill cap. ½"
1	Milling Machine, Lodge & Davis, #10 B&S Spindle
1	Oxygen Compressor, Walker Kidds & Co., Model X-4121

Included are Shafts, Mufflers, Fuel Pump Gears, Diaphragm Plates, Oil Throwers, Cylinder Head Assemblies, Aluminum Valves, Thawing Tanks, Heaters and many related items.

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Osborn No. 42 Core Rollovers
Davenport No. 24SA Rollover

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MACHINERY FOR SALE

Potter & Johnston 5 DE Machine
3 spindle Gould & Eberhardt 36B Rougher
16" D. E. Whiton Gear Cutter motorized & rebuilt by the manufacturer.
Lodge & Shipley Duomatic Lathe.

SIER-BATH GEAR & PUMP CO., INC.
9252 Hudson Boulevard, North Bergen, N. J.

FOR SALE

#11 Cochrane-Bly saw and saw sharpener, with 7½ HP motor, good condition.....$750.00
#PG-6 Ferracute punch press, geared 1¾" stroke, slide adjustment.....$3400.00
6" Avey stock cutting band saw, late model, (exceptional machine.....$375.00
Conveyor, app. 100 ft., 8 to 10 ft. lengths.....per ft. $2.50
Presses, Waterbury-Farrel, double crank, 4" stroke, app. 25 ton, motorized.....$375.00

U. S. Multi-Miller, model MM-1-5-2, table 6"x 21½", motorized, automatic lubrication system, late model, little used.....$750.00
Pratt & Whitney upright shaver, excellent condition. Model M-1257.....$350.00
Model RA-6 six-spindle Asme-Gridley automatic, 9/16" cap., incl. tooling and equipment, ser. #2237A, practically new.....$4550.00
#33P Toledo gap type punch press, 1¾" stroke, Pitman strap and eccentric just rebuilt. Motorized.....$1800.00

BILLARD MACHINE & TOOL CO.
PHONE 44 **MANSFIELD, PA.**

Substantial Saving
on this
Practically New #72 HANCHETT Rotary SURFACE GRINDER

- 3 Wheel Heads with 40 H.P. Motors
- 72" Ring Type Rotary Table—Variable Speed
- Automatic sizing
- Wheel dressers
- Wet grinding system
- Segmental wheel chucks
- All controls in cabinet

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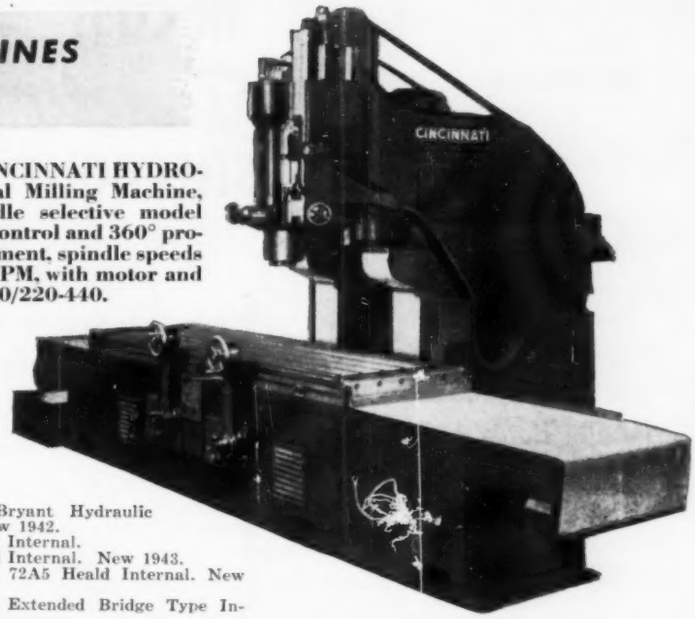
Indianapolis QUALITY MACHINE TOOLS

PARTIAL LIST OF MACHINES NOW IN STOCK



28″ x 60″ CINCINNATI HYDROTEL Vertical Milling Machine, single spindle selective model with depth control and 360° profiling attachment, spindle speeds 30 to 750 RPM, with motor and controls 3/60/220-440.

AUTOMATICS

9/16″ and 1″ RA-6 Acme-Gridley. New 1943.
1¾″ 6 Spindle Greenlee. New 1942.
6″ 4 Spindle Conomatic. New 1942.
6″ Goss and DeLeeuw Chucking Machine—eight spindle. New 1943.
★**Bullard Multaumatic, six spindle model D, single index. Late Model.**

BORING MILLS

★**Universal No. 40 Tri-Way, 4″ bar, with facing head rotary table, boring bar, motor and control.**
Heald No. 49 "Bore-Matic," three spindles each end. New 1942.
Heald No. 47A "Bore-Matic."
Heald No. 46B "Bore-Matic."
Excello Model 2112A, single end. New 1943.

BROACHES

No. CPC 6-30 LaPointe Hydraulic Vertical. New 1941.
LaPointe Universal Broach Grinder.

DRILLS

6′ Carlton Radial, 17″ column.
3′ Cincinnati Bickford Radial, 9″ column. New 1943.
3′ and 4′ Dreses Radial, 11″ column enclosed head, motor on arm, 1938 model.
2′ Pfeffner Jack Knife Radial.
24″ Sibley Sliding Head.
25″ Fosdick Economax. Late model.
No. H3 Barnes Hydram, 8 speed. New 1942.
36 HO Baker. New 1942.
KH 2 Allen, 6 spindle. New 1943.
★**No. 2 MS Allen, one to three spindle, four speed motor on each spindle, 15″ overhang, extra large tables.**
Demco 3 spindle.
Hamilton-Muehlmat.
No. 3 Bausch Multiple Spindle.
Barnes Horizontal Deep Hole, two spindle.

GEAR CUTTERS

No. 7A & 715 Fellows Gear Shaper.
No. 615A Fellows Gear Shaper.
Red Ring Gear Shaper, Model G.C.L.
No. 12 Barber Colman Hobber
Model S Barber Colman Hobber.
Barber Colman Hob and Cutter Grinder.

GRINDERS

No. TG 615 Jones & Lamson Thread. New 1943.
No. 2 Cincinnati Centerless, Filmatic. New 1942.
★**No. 2 Cincinnati Universal Tool & Cutter complete. New 1942.**
No. 4T Sellers Tool.
No. 22 Covel Universal Tool & Cutter. New 1943.
No. 13 Brown & Sharpe Universal and Tool.
No. 3 Brown & Sharpe Universal. New 1943.
10″ x 24″ Landis Universal. New 1942.
14″ x 36″ Norton Universal.
4″ x 18″ Landis, Type H.
6″ x 18″ Cincinnati, Filmatic Bearing.
6″ x 18″ Norton Type C. New 1942.
10″ x 48″ Norton Type "C."
No. 22 Heald Rotary Surface. New 1943.
No. 18 Blanchard, 30″ chuck. New 1942.
16″ x 16″ x 48″ Thompson Model C. Surface.
3B Abrasive, with chuck. New 1943.
No. 5 Brown & Sharpe Surface. New 1942.
No. 15 & No. 18 Gallmeyer Livingstone Surface.
6″ x 12″ x 18″ Thompson Surface. New 1942.
No. 2B Reid Surface, for wet grinding.
No. 16CP16 Bryant Hydraulic Internal. New 1942.
No. 104 Rivett Internal.
No. 75A Heald Internal. New 1943.
No. 72A3 and 72A5 Heald Internal. New 1943.
No. 74 Heald Extended Bridge Type Internal.

LATHES, ENGINE

Hendey 12″ x 30″, g.h.
Reed Prentice, 14″ x 30″, g.h.
Lodge & Shipley Tool Room, 14″ x 54″, rel. att. New 1943.
Reed Prentice, 14″ x 78″, Toolroom. New 1943.
American Pacemaker, 16″ x 30″. New 1942.
Reed Prentice, 16″ x 54″. New 1943.
Sidney 18″ x 54″. New 1943.
Lodge & Shipley 20″ x 48″. New 1943.
28″ x 34′ "Timesaver," g.h. New 1942.
Lodge & Shipley 48″ x 54″, C.D.
Carroll Jamieson, 18″ x 5′, C.D.
South Bend, 14½″ x 6′ New 1944.
Lo-Swing, models IMP and R.
8″ x 15″ and 8″ x 21″ Sundstrand Automatic. New 1943.
8″ x 21″ Faye Automatic. New 1943.
14″ x 42″ Monarch "Magnomatic." New 1942.

LATHES, TURRET

Warner & Swasey No. 4A, with chuck, 7½″ hole.
★**Warner & Swasey No. 2A. New 1943.**
Jones & Lamson No. 9A. New 1943.
Gisholt No. 3L. Late Model.
Acme No. 1 Universal, saddle type. New 1941.
Bardons & Oliver No. 7 Ram Type, Bar Feed and Tooling. New 1942.
Gisholt No. 4 Universal, Hydraulic speed selector.
Warner & Swasey No. 5 Universal. New 1941.
Warner & Swasey No. 4 Universal. New 1941.
Warner & Swasey No. 3 Universal. New 1942.
Bardons & Oliver No. 3 Universal, motor in base. New 1941.
Warner & Swasey No. 2. New 1942.
Bardons & Oliver No. 2, bar feed. New 1941.

MILLS

Milwaukee No. 2D Vertical, Rotary Head. New 1945.
Milwaukee No. 2H Universal. New 1942.
Cincinnati No. 2M Universal.
Brown & Sharpe No. 2A Universal. Late type.
Kempsmith Maximiller Plain, No. 3.
Brown & Sharpe No. 3B Plain. New 1943.
Brown & Sharpe No. 2B Plain.
Cincinnati No 2M Plain.
Milwaukee No. 3H Vertical, latest model.
Cincinnati No. 2 Vertical. New 1940.
Index No. 40H Vertical.
Cincinnati Plain No. 08 and 2-18, Rise and Fall.
Cincinnati No. 1-12 and 1-18 Automatic.
Cincinnati No. 3-36 Hydromatic.
Cincinnati No. 34-36 Hydromatic High column with Hydrotel.
Milwaukee No. 1248 Simplex.
DeVlieg Supermill, No. 31B.
Brown & Sharpe No. 12. New 1942.
Kent Owens No. 1-14.
Whitney Hand Mill, No. 6.
VanNorman Hand Miller. New 1942.

MISCELLANEOUS

Grey Nibbler, 36″ throat, ¼″ capacity.
Savage Nibbler, 8″ throat, 3/16″ capacity.
Cleveland Rigidturner, No. 616.
14″ x 20″ Racine Hydraulic Saw.
13″ x 13″ Peerless High Speed Saw.
No. 26F Norton Hydrolap.
No. 8-6 Zeh & Hanneman S.S. Geared Press.
Toledo No. 41 Horn Press.
Williams White No. 14½ Punch, 1″ through 1″.
Tapper, Leland Gifford 3′ Radial, No. 3 M.T. New 1941.
Parker Tube Bender, No. 824G.
Schauer & Colbourne Speed Lathe.
5 H.P. L'Hommedieu Buffer.
5 H.P. Clark Buffer.
18″ Gardner Disc Grinder.
Lanfelier Type D Swager.

PLANERS & SHAPERS

Ohio Planer, 36″ x 36″ x 16′ M.D.
Cincinnati Planer, 42″ x 42″ x 20′, Four heads D.C.
Cincinnati Planer, 52″ x 36″ x 40′, Four heads. Box table D.C. motor drive.
Gould & Eberhardt 16″ Shaper.
American 24″ Shaper.
Smith & Mills 28″ Shaper.
Pratt & Whitney 6″ Vertical Shaper. New 1943.

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8" Bullard Multaumatic
1⅞" Conomatic 8 spindle
14"x19" & 16"x33" Fay
Gisholt Simplimatic
1¼" Cleveland 4 spindle

BORING MACHINERY

4" bar, No. 42 Lucas horizontal
3" bar Universal horizontal
100" Niles-Bement-Pond, heavy pattern
53" Niles Bement Pond

DRILLS

21" & 24" Cincinnati upright
Nos. 121, 217, 314 & 315 Baker heavy
6', 15" Cint. Bickford radial
24", 6 spindle Foote Burt sensitive
4' Hammond Elbow Arm Radials
B4A—24 spindle Natco
24", 4 spindle Allen & Demco
12", 4 spindle Avey No. ½
15", 3 spindle Avey Type MA6

GEAR MACHINERY

No. 50 Cross Tooth Thinner
6H, 12H & 16HS Gould & Eberhardt
No. 12 Barber Coleman
No. 5M Adams Hobber
No. 4 Cimatool Rounders
No. 130 Cleveland Rigidhobber

GRINDERS, CYLINDRICAL

4"x12" No. 4H Landis
6"x18" Norton, Landis, & Brown & Sharpe
Nos. 1, 2, & 13 Brown & Sharpe Universal
10"x18", 10"x30", & 10"x50" Norton mechanical
10"x18" Landis Type C, Hyd.
10"x24" & 16"x72" Landis Mechanical
14"x36" Landis Type C, Hyd.
16"x36" Landis Type D, Semi-Auto. Hyd.

GRINDERS, SURFACE

16" No. 10 Blanchard Rotary
30" No. 16 Blanchard Rotary
12" & 16" No. 22 Heald Rotary
16" & 24" No. 25A Heald Rotary
8" Pratt & Whitney Rotary
10"x24" Norton Hydraulic
12"x48" Thompson Hydraulic
14"x60" Mattison Hydraulic
14"x40" Pratt & Whitney Vertical
8"x22" Abrasive No. 3
8"x24" Abrasive No. 34 Vertical
24"x48" Springfield Planer Type
6"x18" #2 Brown & Sharpe

LATHES ENGINE

14"x6' Lodge & Shipley
14"x8' American
15"x6' Porter McLeod
16"x30" centers Monarch
18"x8' Lodge & Shipley
36"x16' Bridgeford

LATHES TURRET

24" & 42" Bullard
Nos. 4, 1L & 3AL Gisholt
Nos. 3, 5, 1A, & 3A Warner & Swasey
No. 3 Jones & Lamson
No. 2F Foster Fastermatic

MILLING MACHINES

Nos. 2H, 3H, & 4H Kearney & Trecker Vertical
Nos. 2, 3, & 4 Cincinnati Vertical
Nos. 1, & 1M Kent Owens Hand
Nos. 1-12, 2-18, & 2-24 Cincinnati Automatic
Nos. 2-18 & 2-24 Cincinnati Rise & Fall Automatic
Nos. 3-24, 4-36, 4-48, 5-48, 34-36, 56-72, & 56-90 Cincinnati Hydromatic
Nos. M-18, M-24, & 12-24 Kearney & Trecker

PRESSES

Nos. P1, P2, P3, P4 & P5 Ferracute punching
Nos. 10, 73½, 75½, 304 & 307 Bliss S.S.
No. 1½ Bliss cam drawing
200 ton & 1000 ton French Oil Hyd.
No. 2316½ Hamilton coiner
500 ton No. 2 National Maxi-press

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Low IN COST Timely SELECTIONS

ENGINE LATHES

HENDEY 14"x6' Model EBM Engine Lathe—35" Centers—18 Spindle Speeds, Range 16 to 455 RPM —Taper Attachment.

HENDEY 14"x54" Ctrs 12-speed GH Engine Lathe (1942 Vintage) 18 to 539 RPM.

PRATT & WHITNEY 20"x48" Ctrs Model "B" 16 Speed GH Engine Lathe, 8 to 383 RPM Taper Attachment.

PRATT & WHITNEY 16"x36" Ctrs. Model "B" 16 Speed GH Engine Lathe, 7 to 440 RPM

PORTER-McLEOD 24"x12' MD QCG Engine Lathe, 85" Centers, Taper Attach.

VERTICAL MILLERS

MILWAUKEE #4H Vertical Miller (late type) Tbl Wkg Surf 74"x15½"—16 Spdl Spds, Range 20 to 1000 RPM

BROWN & SHARPE #2 Light type Vert Miller (late type) Tbl Wkg Surf 45"x10", 16 Spdl Spds, Range 55 to 1800 RPM

CIN #1M "Pyramid Column" Vertical Miller—Motor in base (late type) Tbl Wkg Surf 37"x10½"—12 Spdl Spds, 62 to 1000 RPM—#50 Taper

UNIVERSAL MILLERS

CINCINNATI #2 Univ Rect O/A MD Tbl Wkg Surf 52"x12", 16 Spdl Spds 15x375 RPM, Atchmnts

VAN NORMAN #2SU Univ Miller (late type) Tbl Wkg Surf 50"x12", 18 Spdl Spds 25 to 1250 RPM, Atchmnts

BROWN & SHARPE #2A Constant Speed MD Univ Miller, Tbl Wkg Surf 45"x10¾", 16 Spdl Spds 15 to 376 RPM

PRODUCTION MILLERS

CINCINNATI 4-46 Plain Hydromatic Miller (late type) Tbl Wkg Surf 54⅞"x18", 8 Spdl Spds 29-217 RPM

BROWN & SHARPE #12 Plain Miller, Elec Controlled, long. feed 18", 20 Spdl Spds 25 to 1050 RPM

HORIZ. BORING MILLS

YODER #3A Horiz Boring Mill (latest type) 3" bar, max. dist. to outer support 72", bar travel 24"

LUCAS #31 Horiz. Boring Mill, 3" bar, #5 Morse, max. dist. to outer support 60", bar travel 24"—with star facing atchmnt & square auxiliary table.

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16" & 20" MONARCH Model "C" & "M" Lathes
16"x78" AMERICAN "Pacemaker" Lathe
50"x17' cc LeBLOND "Big Swing" Lathe
10"x72" NORTON Type "C" Plain Cyl. Grinder
12"x48" CINCINNATI Model "ER" Univ. Grinder
14"x16"x60" THOMPSON Type "C" Hyd. Surface Grinder
Nos. 3, 4 & 5 W & S Univ. Turret Lathes
Nos. 3 & 5 J&L Univ. Turret Lathes
3'11" AMERICAN "Hole Wizard" Radial

WIGGLESWORTH MACHINERY COMPANY
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BENNETT SPECIALS

36" Bullard Mill Spiral Dr., 3 Jaw, 1942
6" bar Ingersoll Floor Type Mill 6' vert. & 6' hor., new 1943
5" bar Sellers Table Type Mill, 48" spin. to table, 100" spin. to outer support, '42.
4" bar Universal Table Type Mill, 60" spin. to table, 96" spin. to outer support, '42
3½" & 4" Landis Floor Type Mills
10"x48" Cinci. Grinder Plain, Late
48" x 19'6" centers Niles Heavy Lathe, Taper, new 1943
42"x84" centers Amer. Lathe, M.D.
36"x32' bed Niles Lathe, 2 carr., T.A.
20"x92" centers Hendey Lathe, T.A., collets
16"/19½"x54" cc Springfield Lathe, 1944
7' Carlton 17" col. Radial, 1943
Nos. 5, 4, 3 & 2 W. & S. Turrets, Late
#4 Gisholt Univ. Turret Lathe, 1942
No. 3K K. & T. Vert. Miller, 1942
48"x48"x24' Gray Planer, 4 Hds., Non-Metallic ways, '42. Var. Voltage
36"x36"x12' Cinci. Hypro Planer, 4 Hds., Var. Voltage, 1943
24"x24"x16' Ingersoll Planer Type Miller, 4 hds., 20 H.P. AC, M.D.
48" N.B.P. Slotter, Grd., Late
15'x¾" Wicks, Bending Rolls, M.D.

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National Bent Shank Nut Tappers Battery of ⅝" to 1" Machines.
Waterbury-Farrel Fdry. ⅝" and 1" D.S. S.D. Cold Headers, also Thread Rollers.
Fisher 5" Bar, Floor Type Boring Mill. New in 1942.
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SLAB MILL 24" ROLLER TYPE 75 HP MD.
EX-CELLO MODEL 33, EX. THREAD GRINDERS
NORTON PLAIN EX. GRINDER 18"x36"
RIVETT #103 INTERNAL GRINDER
LEES BRADNER CT THREAD MILLERS 36"
GEAR HOBBER G&E 6'x12"
GEAR HOBBER B&S #4—36"
GEAR SHAPER, FELLOWS MODEL 615
FARNHAM FORMING ROLLS 12' & 15'
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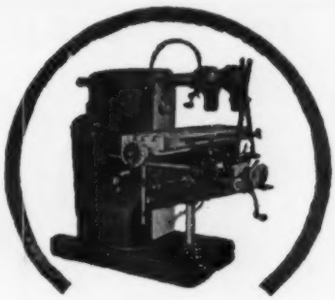
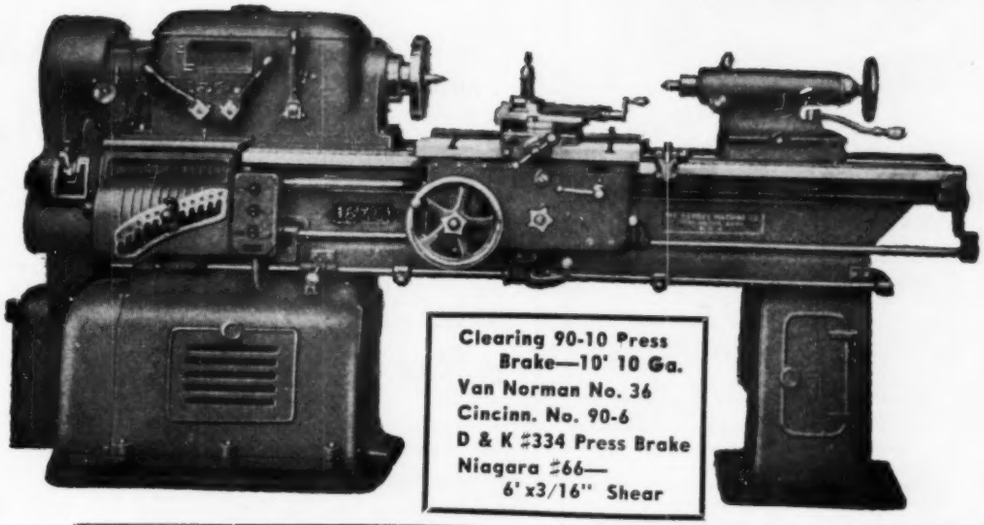


SCARCE LATE MACHINES

B & S 00G Automatics (3)
Van Norman #12, Slotter, etc.
Canedy-Otto 3'9" Col.
Conomatics 6 spdl. 2⅝", 1⅛" late, fully equipped.
NBP 2500 lb. Single Frame Steam Hammer
Ferracute D.D.G. 56, 105 ton Double Action Cam Press.
Universal 3" boring mill
Gorton Duplicators and Vert. Millers, 8D, 9J
Gorton No. 3Z, Engravers
Marvel No. 6 Hacksaw, M.D.
Injection Moulders, Hyraulic Presses
Thompson 6 x 18" Hyd. Surf. Grinder, Type C & F
Abrasive belt, 8x24 Surface Grinders No. 3B, 34, 1½
Conomatic 1⅞" 8 spindle
Brown & Sharpe #5 Cyl. Grinder
Tannewitz Band Saw #36M
Thompson Seam Welder
Mod. 28 Rafter, New 1945
W & S Nos. 3, 4 Grd. Hd. Pre-selector
Gisholt No. 1, 5, Univ. Turrets
Acme #6W M.D., Foster 3B
Oliver 20" Woodworking Planer
Oster 60i Rapiduction, Tooling
Hardinge ESM, 2nd operation
Cincinnati 12x36" Univ. Grinder
No. 18, 25 and 35 Gallmeyer and Livingston Hyd. Surface Grinders, 6x18, 8x24
#25A Heald, M.D., like new Rotary Surf.
Cinn. #2 Centerless Grinders Filmatic, Feeds
B & S No. 2, 2B Surface, M.D.
Norton 6x18" Hyd. Surface, M.D.
Covel #91A Tool, & Cutter Hammond & Excello Carbide Grind
Gardner #226 Disc Grinder
Monarch EE 10"x20" Lathe
Hendey 12x30, G. H. Lathes
Morey No. 3 Univ. Turret Lathe
South Bend, M.D. 9x3½", 10x48", 13"x5'
Sebastian 12"x4' grd. hd.
Rivett No. 918 bench M.D.
Hardinge Cabinet Lathe
Lodge & Shipley 16"x78" 12 speed Grd. Hd. lathe
Buffalo #0 Angle Roll, Excelsior
Bliss #58.0B Gap Presses 62, 62A, 162
Burke Miller Pl. & Univ.
Nichols Hand Miller, Vert. Hd.
Delta Single & Multiple Drills
Oliver Heavy die Filer, 810 Drill Pointer, Sellers 4G
Taylor Winfield 50 KVA Spot Welder
Peerless No. 226, Eyeletting
Hi Speed Hammers, all sizes
Cinn. #3 Pl., #4 Vert. Dial Type, Rect. Arm, Mills
B. & S. #12 Elec. Prod. #21 #000
Waterbury-Farrell #30 Thread Roller & Dies, 1943
Cinn. Bickford 24" Super Serv.
V & O 102 Reducing Press
V & O, Z & H 25, 35, 75 Ton OBI
Cinn. 1-12, 2-18 Production Mills
Stokes Tablet Presses
Ball & Jewel Plastic Grinders
20"x30' Boye & Emmes Grd. Hd., Lathe
Onsrud Router W240
Micromatic Hydrohoner H1
Walker-Turner Bench Drills, ½
Porter-Cable G8 Belt Sander
Le Blond 19"x12 cc. Lathe, Removable cap
Wilder Optical Comparator
Black Diamond Drill Grinder
Cinn. & Schaut. Speed Lathes
Cleveland #1 Vertical Miller
Rockwell, Clark Hardness Testers
Bakewell #1, Ultromat Tappers



Clearing 90-10 Press Brake—10' 10 Ga.
Van Norman No. 36
Cincinn. No. 90-6
D & K #334 Press Brake
Niagara #66—6' x 3/16" Shear

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Power Foot & Gap Shears—30" to 96"
Spot & Arc Welders, 6x6" Racine Hacksaw
5, 7, 14, 18 & 30 ton OBI Power Presses
Ammco 7", Shape Rite 8", Shapers
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500 TON LAKE ERIE PRESS
Platen 35"x36", 36" stroke, 68" opening. 150 H.P., 220-440 V. Meter.

350 TON VERSON PRESS
40x40 platen, 36" stroke, 72" opening. 100 H.P. 3 phase—60 cycle 440 volt.

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All Hydraulic equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your hydraulic problems.

TURRET LATHES

Foster Nos. 4, 5, 6, 1B, 3B, M.D. Univ.
J. & L. 2"x24", 3"x36"
W&S #4, 2A

GRINDERS

Surface Grinders, 6x18, 8x24, Abrasive, G. & L.
P. & W. 14", B.B., Vert. Surface 19"x49"
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D. Cyl.
Heald No. 72A3 Gagematic
Norton 50"x28' M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D. Cyl.
No. 55, 60, 65 Heald Int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10, 11, Cyl.: 1, 3 Univ.

LATHES

26x12' Boye & Emmes 3 step cone D.B.G.
14"x6' Hendey Taper, Collets 16"x8'
9" LeBlond P&W 1"x18" Automatic
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
Wade, Hjorth, Hardinge, P & W Precision Bench

AUTOMATICS

Cleveland Model A ⅞", 1¼", 2"; B 1", 2", ⅞"
Cone 4 spindle, Gridley
Brown & Sharpe #4, 6 Auto., #2 Hand Screw

MISCELLANEOUS

Pexto 3' to 8' Shears & Brakes
Gorton 1A; 375-2 Tool & Cutter Grinders
Wiedman Turret Punch—Type R4P
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers

Deckel G1, G2, G1F Engraving machine
Hanson Whitney Thread Miller, Planetary
Leland-Gifford 1, 2 & 4 spindles, Model MS
Geo Ohl 8' 16 Gage M.D. Shear, 12' 10 Ga. Brake
Oster No. 316 6" Pipe Threader, M.D.
Bliss 30" Gang Slitter

MILLING MACHINES

3B K. & T. Dbl. Overarm
Cleveland Vert. No. 1 M.D.; #1 Univ.
#2B K. & T. Univ.; No. 2, 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos. 1½, 2, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 2, 3, 4 Cincinnati Vert.
P. & W. No. 12, Morey Profilers
B. & S. No. 1, 3 Vert.
Taylor-Fenn Spline Miller

RADIALS

Carlton 8' Arm 19" col. M.D.
4', 5', 6' American Triple Purpose
Walker-Turner ½" cap.

BORING MILLS

#0 Giddings & Lewis arr. M.D. 3"
2½" Cleveland arr. M.D., 2¼", 4" Bissee
Niles-Bement-Pond 4- duplex, 68" Niles
Bullard New Era 24", 42", King 42"

AAron Machinery Co., Inc.

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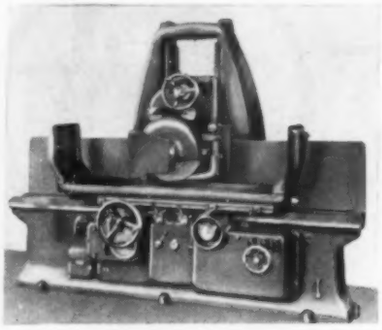

MATTISON—14"x16"x60"—
HIGH POWER HYD. SURFACE GRINDER

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253 Centre St. New York 13, N. Y.

Bor. Mill, Her. 3" G and L, MD.
Boring Mills, 24"-36"-42"-52"-72"-90"
Drills, Radial 3'-4'-5'-6' Cin.-Bick.
Lathe, Turret 5-A W and S. S.P.D.
Lathe, 36"x28' Betts, T.A., MD.
Millers, Plain No. 3 K and T, No. 4 Cin.
Millers, Vertical No. 3 B and S and No. 4 Cin.
Shaper, 16"-20"-24"-36".
Shaper, 36" Morton Draw Cut.

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

Acme-Gridley 9/16" automatic screw machine RA-6
Cleveland 1½" automatic screw machine, 4 spindle
Cincinnati #3 centerless grinders, 1944
Midland #5 turret lathe, preselector head, 2½" cap, bar and chucking, 1941
B & S #3A universal milling machine, fully equipped 1943
K & T #5H and #1H vertical milling machine, 1943
Liberty 48"x48"x18' four head planer, 1942
Defiance #25A horizontal boring mill, 3¾" bar, 1940 auxiliary table
Sidney 18"x11' geared head lathe, swings 21½", taper attachment, 1941
Reed #21 thread rolling machines, 1944

JOHNSON MACHINERY CORP.
59 Edison Place Newark 2, N. J.
Mitchell 3-7608

EXCEPTIONAL BUYS CLEAN TOOLS

No. 4 W-S Turret, Bar feed, quantity of tooling 412,000 plus
6 spindle drill press (Demco) Late
No. 4 Cinn. H.S. Dial Type Vert. Miller Like New
No. 5 Bardon Oliver Turret Chucking Serial 15737
Haskins and Bakewell Tappers Late
Lees Bradner Thread Miller (Cheap)
2-TR-59 Hardinge Lathes Late
Vernon Jig Borer Late

New Machinery in Stock

FERDINAND J. SNOW CO.
381 Broadway Westwood, N. J.
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FOR SALE

1—#2 Savage Roller type Nibbling Machine, complete with circular attach. V-belt drive to 3 HP motor. Good condition.

PHILADELPHIA TRANSFORMER CO.
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PRACTICALLY NEW
STAMCO PRESS BRAKE

126"x12 Gage, Toggle Arm Type
Condition Equal to New

Price $3,500.00

WINSTON MACHINERY CO., INC.
517 South Delaware St., Indianapolis 4, Ind.

PRESSES

375 ton Elmes, 12" stroke, 84x54 bed, late type
350 ton Elmes, 20" stroke, 36x45 bed, late type
250 & 750 Baldwin, 144x48 bed, 40" stroke
#400A Bliss Dbl. Action Toggle, 72x54 Bed, w/cushions, mtrs., controls.
#305 Bliss, 8" stroke, late, w/air cushions.
60 ton, Dbl. Crank, 5" stroke, 48x24 bed, late model Waterbury Farrel (3).
200 ton 12" stroke, 27x27 bed, Bliss 43'.
#56 Toledo 4" stroke, 21x21 bed, 15½" shut height.
35 ton, 4, 5, 6" stroke, latest type, pract. new, w/all accessories, Bliss $850.00 ea.
70-85 ton 4" stroke, 21x27 bed, 110 strokes per min., Bliss, latest type.
90-125 ton 4½" or 5" stroke, 60, 80, 110 (optional) strokes per min., late Type.
Inclinable, new, 20 to 70 ton, immed. dely.

AUTOMATICS, LATEST TYPE

#0G B & S, late type
1" New Brit. Grd., 6 spdl.
1⅜" R4—New Brit. Grid.
1½" & 1⅝" Cone—8 spdl. late
9/16", 1", 1¼", 1⅝", 2", RA6 Acme Grid.
2¼" & 2⅝" Cone 6 Spdl.
16" 8 spdl. Bullard Multaumatics, pract. new, (3) with some tooling, dbl. & sgl. index.
12" 8 spdl. Bullards, late type, lots of tooling.

PAUL'S MACHINERY COMPANY
MONA MEMBER
6111 Vermont Avenue
Detroit 8, Michigan
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No. 2LMS—14"—4 Spdl. L.G.
No. 2MA6—15"—4 Spdl. Avey
No. 3MS—24"—1 Spdl L.G.
No. 3B—24"—6 Spdl. Edlund (1942)
No. 2—8 Spdl. Leland-Gifford
No. 4 BL Natco 36 Spdls.
7'-15" Col. American Full Universtal

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No. 61-A Fellows Gear Shapers (1942)
No. 615-A Fellows Gear Shaper (1942)
No. 712 Fellows Auto Indexing (1943)
No. 72 Fellows Gear Shaper
No. 18-H Gould & Eberhardt
11" Gleason Bevel Gear Cutter
72" Cincinnati Gear Cutter
No. 13 Gleason Univ. Tester

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No. 31 Lucas, 3" bar
No. 3A Universal, 3" bar
Rockford, 3⅛" bar
No. 48-A Heald Borematic

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4"x18" Landis Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
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10"-14"x36" Norton Type C Plain (1942)
Norton Motor Driven Plain Grinders
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12'x36" Landis Type LCH Universal (1945)

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24"x24"x84" Mattison Hydr. Surf
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No. 22—12" Heald Rotary Surface
No. 25A—24" Heald Rotary Surface (1943)

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72A-5 Heald Internal Grinder
No. 5 Bryant Internal Grinder
No. 16-38 Bryant Internal Grinder
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LATHES (Production)

8"x15" Sundstrand, Model B (1942)
8"x15" Sundstrand, Model D (1943)
8"x15" Sundstrand, Model E (1942)
10"x22" Sundstrand, Model AA (1943)
12"x18" Lipe Carbo
16"x33" Fay Automatic (1942)
20"x25" Fay Automatics (1942)

MILLING MACHINES

No. 4 Cincinnati Plain (1943)
No. 08 Cincinnati Vert. (1942)
No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Standard Milwaukee Vert.
No. 3 Cincinnati Vert. High Power
No. 1 U.S. Hand Millers
24" Cincinnati Production
No. 1-18 Cinn. Mfg. (1940)
No. 2—18" Sundstrand Electromil (1942)
No. M-18 Milwaukee Simplex (1942)
No. M-24 Milwaukee Simplex (1942)
Fitchburg Duplex Miller (1943)
No. 4-48 Cinn. Hyd. Tracer (1942)
No. 45-48 Cinn. Hyd. Plain Tracer (1942)
No. 56-90 Cinn. Hydromatic (1943)
No. 2 Hanson-Whitney Thread
4"x9" Hanson-Whitney Univ. Thrd. Miller
4½"x12" Pratt & Whitney, Model C
6"x20" Pratt & Whitney, Model C
6"x36" Lees-Bradner—Model HT (1943)
6"x48" Pratt & Whitney Thrd. Miller
6"x132" Pratt & Whitney Thread Miller
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Baush Tapper

TURRET LATHES

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No. 3 Bardons & Oliver (1942)
No. 5 Warner & Swaseys (1942)
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(CONTINUED FROM PAGE 221)

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6" Bar Simmons Horizontal (1943)
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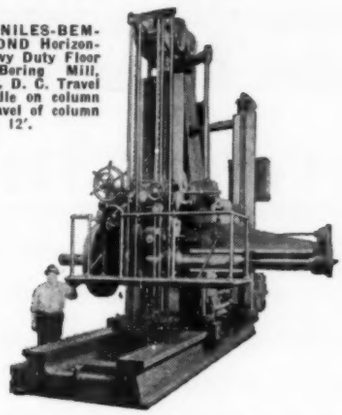

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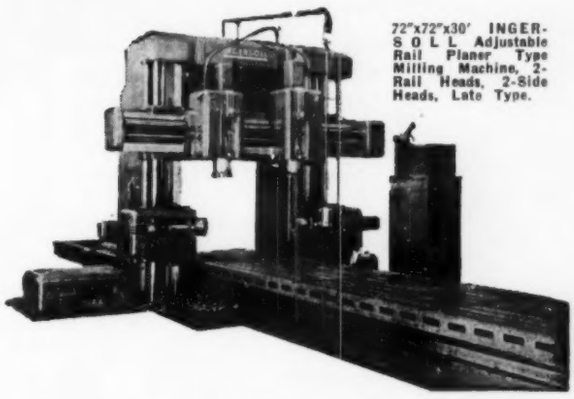

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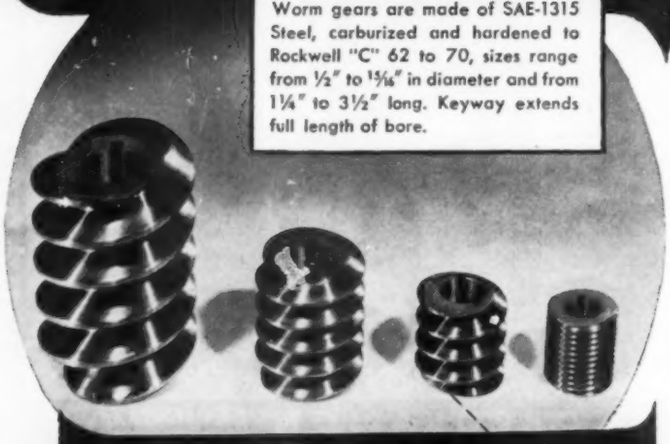

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SUNNEN PRECISION HONING

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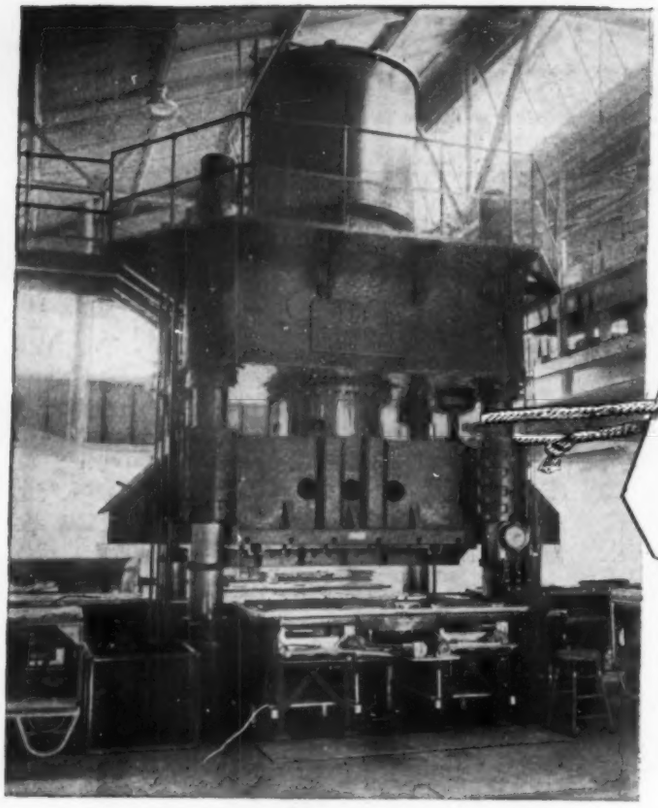

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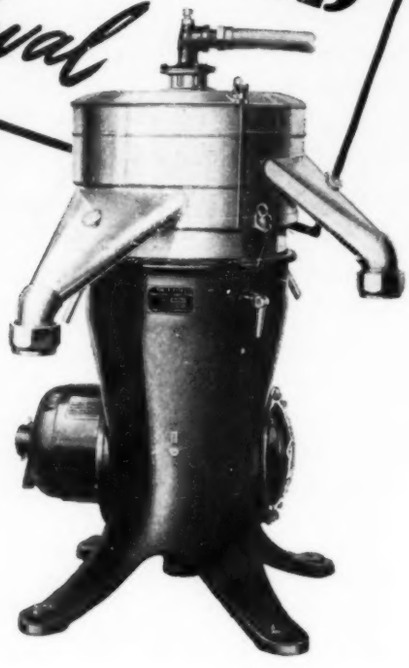


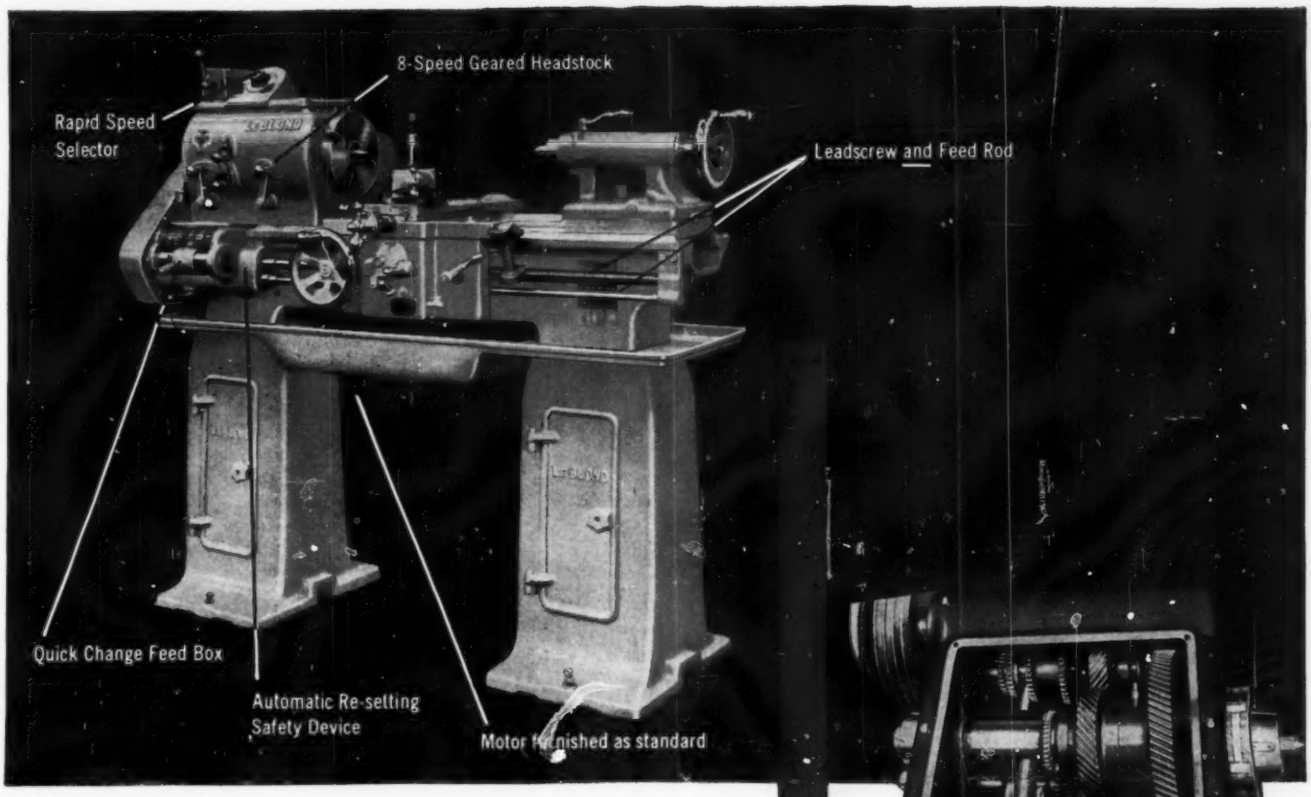
EVEN a small amount of water in a press or any hydraulic mechanism can cause parts to rust, valves to stick, and leather seals to harden. Solid impurities can cause scoring of cylinders and other costly damage.

Protect your presses and other hydraulic mechanisms by removing both water and solid impurities from hydraulic oils with a De Laval Oil Purifier. Using centrifugal force — more efficient, more rapid and more effective than any other means of oil purification — De Laval units not only save oil by restoring it continuously to "like new" purity, but also save tools, dies, work and machines from damage.

Moreover, hydraulic oil is only one of the many oils that are effectively purified by De Laval. Cutting oil, drawing oil, honing oil, washing and quenching oils . . . oils for every factory application can be processed with equal opportunities for savings. Bulletin MM-1 lists many applications which are proving the many advantages of saving oil — and ***more*** than the oil — the De Laval way.

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

Save more than the oil with **DE LAVAL**
PURIFIERS and CLARIFIERS FOR FACTORY OILS
Save work! Save tools! Save machines!



more for your money with Le Blond Regals

6 SWING SIZES — 13" TO 24"

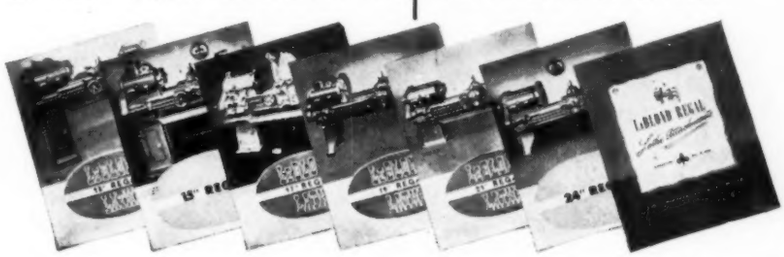
You definitely get your money's worth and then some, when you buy one of the six LeBlond Regals in 13", 15", 17", 19", 21", or 24" sizes. They're light pattern engine lathes with plenty of stamina and precision. Built in the same plant with LeBlond heavy duty lathes. All six equipped with both leadscrew and feed rod which assures long-life accuracy of the leadscrew. Electric brake with apron control, standard on 21" and 24" sizes, is available as extra equipment on all other models. Standard tapered spindle nose now furnished on all Regals.

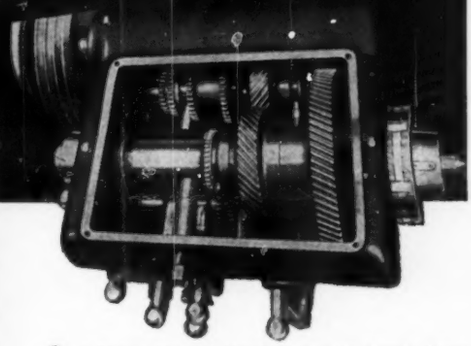
Low initial cost plus low operating costs prove there's no better lathe value than Regals.

send for Regal bulletins today.

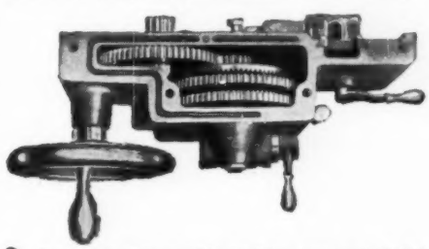
THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES





1. 8-Speed Geared Headstock with simple lever control of speeds and feeds. All Regals now furnished with standard tapered spindle nose at no extra charge.



2. One-piece Apron with positive jaw feed clutch Single lever controls both length and cross feed; safety interlock prevents double engagement.

3. Inverted Vee-type Bed is built exceptionally heavy, provides rigid base for carriage and tailstock travel, assures long life accuracy.

LeBLOND

Timken® bearings make light of heavy loads

on new LeBlond 25" heavy duty engine lathe

HEAVY cuts and big jobs, such as those handled by this 25" LeBlond lathe, put tremendous loads on the spindle. The pre-loaded Timken tapered roller bearings used at the spindle nose provide greater thrust and radial capacity than the heaviest working pressure of the lathe.

The tapered construction of Timken roller bearings enables them to carry tremendous thrust as well as radial loads without deflection or end-movement. And it permits accurate pre-loading to any desired degree.

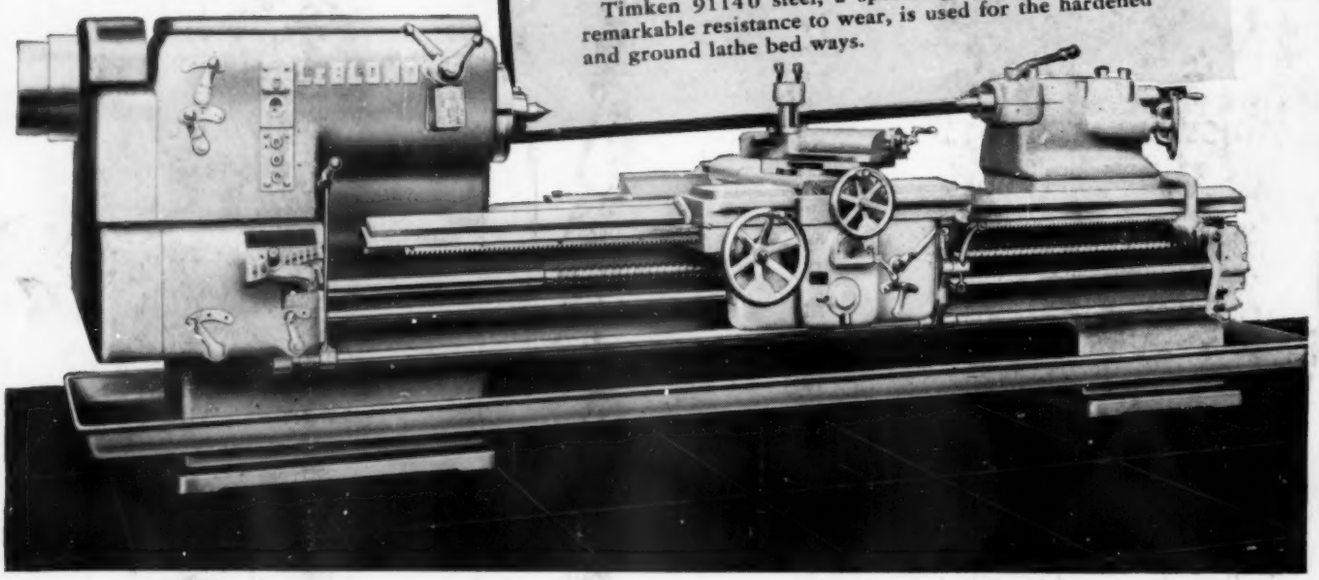
Timken bearings are precision products throughout. The rolls and races are made of Timken fine alloy steel for toughness, case-hardened for exceptional resistance to wear, and finished to incredible smoothness for virtually friction-free operation. The line contact between rolls and races provides maximum load carrying capacity.

No other bearing can give you *all* the advantages you get in Timken tapered roller bearings. Make sure you have Timken bearings in every machine you build or buy. Look for the trade-mark "Timken" on the bearing. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN BEARING EQUIPPED — *This symbol on a product means its bearings are the best.*

FOR GREATER PRECISION AND LONG LIFE, The R. K. LeBlond Machine Tool Company uses a total of 10 Timken tapered roller bearings on the spindle nose and intermediate shafts of this heavy duty engine lathe.

Timken 91140 steel, a special graphitic alloy with remarkable resistance to wear, is used for the hardened and ground lathe bed ways.



TIMKEN BEARING CAPACITY RATINGS INCREASED 25%.

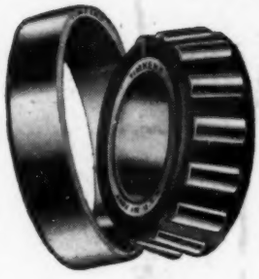
Since Timken bearings were last re-rated some 15 years ago there has been such a further and constant improvement in quality that we are now able to announce a 25% increase in radial and thrust load carrying capacity. This may make possible the use of smaller bearings with savings in bearing cost, material cost and weight. Engineers will be able to utilize the advantages of Timken bearings in more applications than in the past.

A new Timken Engineering Journal, now in preparation, will give you complete capacity rating tabulations. For further assistance, write us today.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION